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Subsistence Salmon Harvests in the Kuskokwim Area, 2010

Annual Report for Study 10-352

USFWS Office of Subsistence Management

Fisheries Resource Monitoring Program

by

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and

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August 2012

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

The Alaska Department of Fish and Game (ADF&G) in partnership with Orutsararmiut Native Council (ONC) in Bethel and Kuskokwim Native Association (KNA) in Aniak have utilized a voluntary survey program to estimate salmon harvest for the Kuskokwim Area. Harvest information was collected through postseason household interviews and harvest calendars. Simple random sampling, stratified random sampling, and 100% census techniques were used to select households to be interviewed, based on community size and user group designations. For the community of Bethel, subsistence salmon harvest information was collected by ONC. Subsistence salmon harvest information was collected by KNA in Aniak, and ADF&G surveyed the remaining communities in the Kuskokwim Area. Data from surveyed households were expanded to estimate the harvest of un-surveyed households when historical data for that community existed. In 2010, 2,273 households were surveyed in 27 communities in the Kuskokwim Area, including most communities along the Kuskokwim River, Kongiganak in North Kuskokwim Bay, and all communities within South Kuskokwim Bay. Subsistence salmon harvest estimates for 2010 were: 69,242 Chinook salmon; 47,885 chum salmon; 41,042 sockeye salmon; 34,169 coho salmon; and 758 pink salmon.

Key words: subsistence, Chinook *Oncorhynchus tshawytscha*, chum *O. keta*, and coho *O. kisutch*, salmon, harvest, salmon, Bethel, Aniak, Kuskokwim River, Kuskokwim Bay.

INTRODUCTION

The purpose of this study is to conduct postseason subsistence harvest surveys in the Kuskokwim Management Area. This study is a continuation of the Kuskokwim Subsistence Salmon Monitoring Program (Monitoring Program). The Monitoring Program collects data about the number and species of salmon harvested by area residents. These data are then analyzed to provide an estimate of the number of salmon harvested for subsistence purposes in the Kuskokwim Area. The following is a quantitative analysis of data collected during the house-to-house harvest surveys describing the 2010 fishing season in the Kuskokwim Area.

The Kuskokwim Area (Figure 1) subsistence salmon fishery is one of the largest in the state in terms of the number of residents who participate and the number of salmon harvested (Fall et al. 2009). Alaska Department of Fish and Game (ADF&G) Division of Subsistence studies in the region indicate that fish contribute as much as 85% of the total pounds of fish and wildlife harvested in a community, and salmon contribute as much as 53% of the total annual harvest of fish and wildlife for subsistence (ADF&G 2011). In addition to other species, residents of the Kuskokwim Area harvest all 5 locally occurring species of Pacific salmon for subsistence purposes: Chinook *Oncorhynchus tshawytscha*, chum *O. keta*, coho *O. kisutch*, pink *O. gorbuscha*, and sockeye *O. nerka* salmon. Drift gillnetting, set gillnetting, and rod and reel fishing are the primary methods used when harvesting salmon.

From June through October, the movement of families from permanent winter residences to summer fish camps situated along tributary and mainstem rivers and sloughs continues to be very important in annual subsistence harvest efforts. During these months, daily activities of many Kuskokwim Area households revolve around subsistence fishing activities. Subsistence salmon harvest practices represent a complicated dynamic between culture, tradition, salmon biology, and local economy (Simon et al. 2007; Patton and Carroll *In prep*).

Since 1960 the Monitoring Program has estimated salmon harvest primarily through household surveys, and to a lesser extent harvest calendars and post card surveys. This information has been used by ADF&G, U.S. Fish and Wildlife Service (USFWS), the Alaska Board of Fisheries (BOF), and the Federal Subsistence Board to manage customary and traditional uses of salmon and provide reasonable opportunity for continued customary and traditional uses of salmon throughout the region. In 2001, the BOF found that the following amounts of fish were

reasonably necessary for subsistence (ANS) in the Kuskokwim River drainage: 64,500 to 83,000 Chinook salmon; 39,500 to 75,500 chum salmon; 27,500 to 39,500 sockeye salmon; and 24,500 to 35,000 coho salmon (5 AAC 01.286.b). A species-specific ANS range provides an index of the extent to which reasonable opportunity was provided in each subsistence fishery. At present, subsistence fishermen in the Kuskokwim Area are not required to report their harvest to ADF&G or to any federal management agencies, and licenses and permits are not required to participate in the subsistence fishery. With only a few exceptions for special management areas (e.g., Aniak River), there are no subsistence harvest or bag limits throughout much of the Kuskokwim Management Area. Legal subsistence fishing gear includes gillnets (which are most common), beach seine, rod and reel, fish wheel, and spear (5 AAC 01.270). The mesh size used for drift and set gillnets are not regulated, but aggregate length of gillnets and depth is restricted by regulation.

Annual documentation of the subsistence salmon harvest is necessary to determine if sufficient salmon are returning to the Kuskokwim Area for escapement and subsistence requirements. The primary method of estimating this harvest is the annual subsistence salmon harvest survey described in this report. This report also details aspects of the operational plan as the 2008 to 2010 seasons have been a transitional time and it is important that methods and implementation of methods and protocols be documented.

The significance of salmon harvests and uses for subsistence in the Kuskokwim area is well documented by ADF&G studies. They indicate that salmon contribute as much as 53% of the total pounds of fish and wildlife harvested in a community (ADF&G 2011). The harvest of salmon for subsistence has ranged from 241 lbs usable weight per capita (e.g., Nunapitchuk, 1983) to 649 lbs per capita (e.g., Akiachak, 1998).

There are 38 communities in the Kuskokwim Area, 28 of which are surveyed each year based on voluntary involvement in the study (Table 1, Figure 1). In 2009, there were approximately 4,800 households in these 38 communities. Most subsistence salmon harvest occurred in the lower Kuskokwim River, which in 2009 comprised 65% of the total Kuskokwim Area households (Carroll and Hamazaki 2012). For example, in 2009 the harvest in communities from Tuntutuliak to Tuluksak (Figure 1) of the lower Kuskokwim River was 67,199 Chinook; 34,193 chum; 26,835 sockeye; 23,072 coho; and 523 pink salmon. The majority of the subsistence salmon harvest in the lower river was in Bethel which is the largest community in the region, consisting of approximately 2,000 households in 2009 (Carroll and Hamazaki 2012).

In the Middle Kuskokwim River area, comprising 7% of the Kuskokwim Area households in communities from Lower Kalskag to Chuathbaluk, the harvest in 2009 was 7,004 Chinook; 4,778 chum; 2,877 sockeye; 2,893 coho; and 8 pink salmon. The majority of subsistence salmon harvest in the middle Kuskokwim River was in the community of Aniak, with 183 households. In the upper Kuskokwim River area, comprising 7% of the Kuskokwim Area households in communities from Crooked Creek to Nikolai, the harvest in 2009 was 3,170 Chinook; 3,478 chum; 4,640 sockeye; and 3,483 coho; and 6 pink salmon (Carroll and Hamazaki 2012).

The north Kuskokwim Bay communities of Kwigillingok, Kongiganak, and Kipnuk comprised 6% of the Kuskokwim Area households in 2009 (Carroll and Hamazaki 2012). These communities are not located on the Kuskokwim River, but many subsistence salmon fishing households from these communities have travelled to the Kuskokwim River to fish, in addition to fishing in areas closer to their communities (Fall et al. 2009). Of these north Kuskokwim Bay communities, only the community of Kongiganak (92 households in 2009) has participated in the

voluntary harvest survey and their harvest in 2009 was 1,118 Chinook; 1,285 chum; 808 sockeye; 610 coho; and 0 pink salmon (Carroll and Hamazaki 2012).

The communities of Quinhagak, Goodnews Bay, and Platinum, located in south Kuskokwim Bay, comprised 5% of the Kuskokwim Area households in 2009. Subsistence fishermen from these communities harvested salmon primarily from the Kanektok, Arolik, and Goodnews river drainages (Simon et al. 2007). The 2009 subsistence harvest in this area was 3,609 Chinook; 1,465 chum; 2,811 sockeye; and 2,032 coho; and 26 pink salmon (Carroll and Hamazaki 2012).

The Bering Sea coastal communities of Mekoryuk (on Nunivak Island), Newtok, Tununak, Toksook Bay, Nightmute, and Chefornak comprised 9% of Kuskokwim Area households in 2009 (Carroll and Hamazaki 2012). Subsistence users from these communities harvested salmon from coastal waters as well as area tributaries (Simon et al. 2007), however, these communities have not chosen to participate in the study for most years, therefore the subsistence salmon harvest for this area has not been consistently estimated and is not presented here.

For the Kuskokwim Management Area, in 2009 the estimated total subsistence salmon harvest (excluding pink salmon) was 197,360 fish, a decrease of 32% from 2008 when the total estimated harvest was 292,287 salmon (Carroll and Hamazaki 2012), and a 25% decrease from the recent 5-year (2004 to 2008) average harvest of 264,833 salmon (Appendices H1–H4). For the recent 5-year period 2004–2008, the average annual estimated subsistence harvest was 98,629 Chinook; 73,179 sockeye; 49,594 chum; and 43,431coho salmon (Appendices H1–H4). Pink salmon harvest estimation began in 2008, so historical data is not provided for that species in this report.

The Division of Subsistence conducted harvest monitoring in the Kuskokwim area from 1988 through 2007. In 2008 the Division of Commercial Fisheries re-established its supervision of the program in the Kuskokwim Area and changed some aspects of the methodology. Following this change, the archived data collected by the Division of Subsistence from 1990 through 2007 were reviewed and the annual subsistence salmon harvest was reconstructed using a standardized method. The resulting estimates of harvest reported in each community were similar to the original estimates, and the analysis indicated that the change in methodology would not unduly bias or affect the accuracy of the results, compared with previous results (Hamazaki 2011; Carroll and Hamazaki 2012). However, after expanding reported harvest estimates to represent the total harvest, including households and communities that were not surveyed, the new estimates tended to be higher than the original estimates. The difference was attributed to the change to a stratified random sampling design which better represented household fishing patterns within a community, and the use of a new statistical approach for estimating harvest from unsurveyed or underrepresented communities, based on each community's historical harvest patterns (Hamazaki 2011).

METHODS

The primary objective of the Monitoring Program in 2010 was to estimate total subsistence salmon harvests on a drainagewide basis. This report also introduces the newly revised historical estimates so that the 2008 to 2010 subsistence salmon harvest estimates can be placed in a historical context. For a more thorough discussion of the transition to new methodologies and the historical estimate revision see Hamazaki 2011.

STUDY DESIGN

The postseason subsistence harvest survey was designed based on stratified random survey methodology (Scheaffer et al. 1999), except for Bethel and Aniak. In this survey design, each household was the primary sampling unit, and was assigned to one of three strata based on its recent 2-year history of participation in the subsistence fishery as follows:

- Usually fish: a household that participated in subsistence fishing activities at least once in the past 2 years.
- Usually do not fish: a household that did not participate in subsistence fishing activities in the past 2 years.
- Unknown: a household that has no harvest record (e.g., a new household).

Households that were not surveyed in the previous 2 years were assigned to their most recent years' classification. For this study, "fishing household" was defined as a household that participated in subsistence fishing activities, such as harvesting and/or processing salmon. The household stratification was updated prior to the survey and was not re-assigned during the survey year (i.e., no postsurvey reclassification). From each stratum, survey households were selected randomly in the following percentages: usually fish—50%; usually do not fish—30%; unknown—100%. When the number of households in each stratum was less than 5 households, all households in the stratum were surveyed. Likewise, when total number of households in a community was less than or equal to 40, all households in the community were surveyed and the survey method was then a census (100% surveyed). In Aniak the survey method is also a census because KNA has the resources to survey all households.

In Bethel, the survey was conducted based on simple random survey methodology where each dwelling was the primary sampling unit. As the main hub city of Western Alaska, the population of Bethel is highly fluid; a high proportion of the population moves in and out of Bethel on a regular basis (Krauthoefer 2005). Additionally, people often change dwellings. This makes it difficult to maintain an accurate and complete household list. A dwelling list was obtained from the Bethel city planner's office and fire department occupant dwellings map and list. This list was ground–truthed and updated previous to the survey season. Based on the updated list, 50% of occupant dwellings were randomly selected for survey.

The postseason subsistence harvest surveys were conducted in early fall because the majority of salmon fishing was finished, yet fishermen could still recall their harvest numbers because the season had ended recently. In Aniak and Bethel, the survey was conducted by KNA and ONC, respectively, and the other 25 communities were surveyed by ADF&G.

Before conducting interviews, all surveyors (including KNA and ONC surveyors) were trained in surveying techniques, including suggestions on how to get the best information possible from people who may not know the exact number of fish they harvested or who are not accustomed to quantifying their fish harvest. In addition, the surveyors were trained in salmon species name identification, as local names for salmon vary throughout the drainage. The surveyors were also briefed on any fishery issues or concerns from the recent subsistence and commercial salmon fishing season, in case the surveyors encountered these issues when conducting surveys.

During the survey, the survey crew contacted community officials to notify them about the project before arriving in the community to conduct surveys. The household lists were then

further detailed and corrected as the surveyors completed the survey process in the community. During interviews, both surveyors and surveyed individuals contributed to the quality of the estimate. Surveyors had a responsibility to attempt to contact all selected households, ask questions consistently and understandably, and foster a cooperative atmosphere. Surveyors attempted to interview a member of each selected household, preferably the primary harvester. Occasionally, interviews were conducted with households not pre-selected for the survey. Those households were either 1) "new" or previously "unknown" households found by surveyors, or 2) voluntarily provided surveyors with their harvest information. All collected survey data was entered into the ADF&G subsistence harvest database, and harvest estimates were generated for the Kuskokwim Area. All subsistence harvest data was treated as confidential information, such that all household harvest data were reported anonymously, and at the community level. The study was generally conducted in accordance with the Alaska Federation of Natives' "Guidelines for Research" (AFN 2011).

THE SURVEY FORM

Most interview questions were designed to provide a quantitative assessment of each household's subsistence salmon harvest (Figure 2). A fishing household was identified by the question: "Did anyone in your household harvest salmon for subsistence use OR keep fish for subsistence use from commercial fishing?" (Question 3, Figure 2). The surveyor was instructed to clarify that "harvest" includes any participation in the subsistence fishery, such as cutting fish. In the case of a household fishing with or helping others, the household harvest documented in this study was only that household's *share* of the group harvest (by species) (Question 7, Figure 2). This household harvest included salmon that members of this household gave away, ate fresh, fed to dogs, or lost to spoilage. To avoid double-counting of fish between households, salmon received from other households (outside the fishing group) are not considered part of the household harvest because they are part of the harvest of the household that *gave* them the fish.

Households were also asked how many families had been involved in the fishing group and how much of the group's catch went to the selected household. Households were also asked whether the household had given salmon to other families (outside of the fishing group) or whether they had received salmon from other subsistence households (outside of the work group), from a commercial fisherman, or from a test fishery project. In addition, households were asked how many salmon were harvested for dog food.

Fishermen occasionally did not know the actual number of fish harvested, instead reporting harvest in alternative terms, such as the number of 5-gallon buckets, plastic bags, gunny sacks, or pounds. ADF&G devised a conversion sheet to estimate fish numbers in these circumstances (Appendix I1).

In order to attempt to assess the 'success' of fishermen's' subsistence harvest respondents are asked the *number* of fish, by species, the household "usually harvested" or "needed" to meet their harvest goals (Question 13, Figure 2). Though these are qualitative data, the responses ('needed' number of fish divided by household harvest of fish) were binned by percentages of harvest met: 25%, 50%, 75% and 100% (Appendices F1 to F4). For this question responses were divided into two categories 1) responses from households that harvested salmon and 2) responses that did not harvest salmon. For the purposes of this analysis, responses from category 2 are not included. The reason for this is that these households will likely be receiving salmon throughout the year and at the time of the surveys, a harvest needs and success assessment was premature. In order to assess the total number of fish that are needed for the whole community, the number of

fish reported as needed from *all* households were expanded to create an overall estimate of how many salmon were needed (Appendix F5).

After the households were interviewed, survey forms were edited. During editing, forms from fishing group members or forms of those who shared fish with each other were compared to identify discrepancies. Follow-up calls were made to try to settle discrepancies. Occasionally, fishing group members simply did not agree on numbers for salmon harvest. In this event, ADF&G project staff made a judgment on how to best represent the fish harvest on the appropriate survey forms and priority was always given to ensuring the accuracy of the *household* harvest over the *group* harvest.

HARVEST CALENDARS

In addition to household harvest survey, subsistence salmon harvest calendars were distributed by mass mailing to households identified as those that "usually fish" in late April or early May each year to ensure they were available to fishermen prior to the start of the salmon fishing season. The calendar has been instrumental for examination of subsistence harvest timing, and assists fishermen in keeping track of their daily salmon harvest inseason for reference during post season surveys.

Calendar mailings were based on the most up-to-date household lists used in the harvest monitoring program. Extra calendars were kept at the Bethel ADF&G office for distribution as needed or upon request. In an effort to increase the use and return rate of subsistence calendars, public service announcements were broadcast on local radio stations inseason reminding fishermen to keep their calendars up to date and describing the importance of calendars for documenting subsistence use. Fliers describing the importance of subsistence calendars and the post season subsistence survey project were also distributed to local communities for posting in public locations such as council offices, local stores, and post offices.

Data from the returned calendars were not used directly to generate Kuskokwim Area harvest estimates, but provide harvest-timing information. However, because gathering harvest-timing data from harvest calendars was not a primary objective of this project, those estimates were not included in this report.

DATA ANALYSIS

Harvest Estimation:

Expanded Community Harvest

Subsistence salmon harvest reported by sampled households was expanded to estimate community harvest for each species using a stratified random sampling expansion technique (Scheaffer et al. 1999). The stratified expansion procedure was performed for a community only if a sufficient number of households were sampled. The criteria for whether or not to do an expansion were: large communities (greater than 30 households) required a sample size of at least 10 respondent households, and small communities (at most 30 households) required a sample size of at least 5 respondent households. In instances when the minimum sample requirements were not met, statistical expansion was not performed. In those situations, the community-based harvest was estimated using Bayesian methods.

Denote that:

N_{kj} = the number of households in *j*th (*j* = usually fish, usually do not fish, unknown) use group of

the *k*th community

n_{kj} = the number of surveyed households in the *j*th use group of the *k*th community

y_{kji} = response of *i*th surveyed household ($i = 1 \ldots n_{kj}$) in the *j*th use group of the *k*th community (e.g., the number of fish harvested by a household)

Mean household response in the *j*th user group of the *k*th community ($\bar{y}_{kj}$) was calculated as:

$$\bar{y}_{kj} = \frac{\sum_{i=1}^{n_{kj}} y_{kji}}{n_{kj}} \qquad 1$$

and its standard error (SE_{kj}) was calculated as:

$$SE_{kj} = \sqrt{\frac{s_{kj}^2}{n_{kj}}\left(\frac{N_{kj} - n_{kj}}{N_{kj}}\right)} \text{ where } s_{kj}^2 = \frac{\sum_{i=1}^{n_{kj}} \left(y_{kji} - \bar{y}_{kj}\right)^2}{n_{kj} - 1}. \qquad 2$$

The estimate of total harvest of the *k*th community ($\hat{T}_k$) was calculated as:

$$\hat{T}_k = \sum_{j=1}^{3} N_{kj} \bar{y}_{kj} \qquad 3$$

and its 95% confidence interval (95% CI_k) was calculated as:

$$95\%\text{CI}_k = 1.96 \cdot \sqrt{\hat{V}(T_k)} \text{ where } \hat{V}(T_k) = \sum_{j=1}^{3} N_{kj}^2 \left(\frac{N_{kj} - n_{kj}}{N_{kj}}\right)\left(\frac{s_{kj}^2}{n_{kj}}\right). \qquad 4$$

When one stratum was not surveyed, total harvest of a community ($\hat{T}_k$) was calculated as:

$$\hat{T}_k = \left(\frac{\sum_{j=1}^{3} N_{kj}}{\sum_{j=1}^{2} N_{kj}}\right) \sum_{j=1}^{2} N_{kj} \bar{y}_{kj} \qquad 5$$

and its 95% confidence interval (95% CI_k) was calculated as:

$$95\%\mathrm{CI}_k = 1.96 \cdot \sqrt{\hat{V}(T_k)} \text{ where } \hat{V}(T_k) = \left(\frac{\sum_{j=1}^{3} N_{kj}}{\sum_{j=1}^{2} N_{kj}} \right)^2 \sum_{j=1}^{2} N_{kj}^2 \left(\frac{N_{kj} - n_{kj}}{N_{kj}} \right) \left(\frac{s_{kj}^2}{n_{kj}} \right). \quad 6$$

The above methods were used for estimation of salmon harvests (survey question 7), the number of fish needed/usually harvested (survey question 13), and the number of people (survey question 2).

For estimation of the number of subsistence fishing households in each community, the following expansion method was used:

Denote that

$n_{kj(s)}$ = the number of surveyed households that subsistence fish in the *j*th harvest group of the *k*th community .

n_{kj} = the number of surveyed households in the *j*th harvest group of the *k*th community.

Then, the proportion of households who subsistence fish in the *j*th harvest group of the *k*th community ($\hat{p}_{kj(s)}$) was calculated as:

$$\hat{p}_{kj(s)} = \frac{n_{kj(s)}}{n_{kj}}.$$

Estimated number of households that subsistence fish in the *k*th community ($\hat{N}_{k(s)}$) was calculated as:

$$\hat{N}_{k(s)} = \sum_{j=1}^{3} N_{kj} \hat{p}_{kj(s)};$$

and its 95% confidence interval (95% CI_k) was calculated as:

$$95\%\mathrm{CI}_k = t_{(0.025, df=n-1)} \cdot \sqrt{\hat{V}(\hat{N}_{k(s)})} \text{ where } \hat{V}(\hat{N}_{k(s)}) = \sum_{j=1}^{3} N_{kj}^2 \left(\frac{N_{kj} - n_{kj}}{N_{kj}} \right) \left(\frac{\hat{p}_{kj(s)}(1 - \hat{p}_{kj(s)})}{n_{kj} - 1} \right).$$

Harvest estimation of non-surveyed and under-surveyed communities

Harvests of several communities were not estimated every year because surveys were not conducted or survey data were insufficient. Harvests of those communities were estimated by employing a Bayesian hierarchical multiple imputation method (Honaker and King 2010; King et al. 2001). In this method, it was assumed that 1) the pattern of missing harvest data take missing at random (MAR) process and 2) the harvest data possess multivariate normal distribution.

Under these conditions, harvests of communities in particular years can be estimated from harvest records of the communities in other years and surrounding communities. For instance, the harvest of the un-surveyed community of Tuntutuliak in 2008 was estimated by its harvest during 1990–2007 and harvests of other middle Kuskokwim communities. It should be noted that this estimation method is available and appropriate only for communities with several years of annual harvest estimates.

Let $D_{kj.obs}$ be observed data (e.g., average harvest per household) for k communities (1…k) with j years (e.g., j =20, data available for 1990–2009).

$$D_{kj.obs} \sim N(\mu_k, \Sigma_k) , \quad (7)$$

where μ_k has a normal prior distribution with mean μ and variance σ^2, and Σ_k is Wishhart distribution of $k \times k$ dimensions.

$$\begin{aligned} \mu_k &\sim N(\mu, \sigma^2) \\ \Sigma_k &\sim W(I_k, k) \end{aligned} . \quad (8)$$

Then, posterior for μ_k and Σ_k were derived as

$$\tilde{\mu}_k, \tilde{\Sigma}_k \sim P(\mu_k, \Sigma_k \mid D_{kj.obs}) . \quad (9)$$

From this predicted value for missing data $D_{kj.mis}$ were derived as

$$\tilde{D}_{kj.mis} \sim P(D_{kj.mis} \mid D_{kj.obs}, \tilde{\mu}_k, \tilde{\Sigma}_k) . \quad (10)$$

For grouping of the k communities, geographic subregions of the Kuskokwim Management Area were used: 1) lower Kuskokwim River and Kongiganak; 2) middle Kuskokwim River; 3) upper Kuskokwim River; and 4) South Kuskokwim Bay.

In applying the above method, log-transformed annual average number of fish harvested per household $D_k = \log(T_k/N_k+1)$ was used. This was based on assumptions: 1) fishing characteristics of communities (e.g., proportion of fishing households, fishing demands, fishing efforts, etc) are constant over time, and 2) changes in average household harvests are primarily due to abundance of fish or fishing regulations affecting all communities.

For the Bayesian estimation, WinBUGS 1.4.3 (Lunn et al. 2000) with default initial values were used. A total of 55,000 imputations were generated (after discarding 5,000 initial burn-in iterations) and the mean value of these imputations was calculated. The resulting mean household harvest was back-transformed and multiplied by the number of households in the community that year to estimate the unknown total community harvest. Total community harvest was calculated as:

$$\tilde{T}_{kj} = N_{kj} \exp(\tilde{D}_{kj.mis}) , \quad (11)$$

and its 95% confidence interval was estimated as:

$$95\%\text{CI} = N_{kj} \exp\left(1.96 \cdot \sqrt{V(\tilde{D}_{kj.mis})}\right), \quad 12$$

where $V(\tilde{D}_{kj}^{mis})$ is the standard deviation of the Bayesian estimate.

Total Kuskokwim Area Harvest

Total number of salmon harvested in the Kuskokwim Area ($\hat{T}$) was estimated by summing harvest estimates of all communities,

$$\hat{T} = \sum_{k=1} \hat{T}_k, \quad 13$$

and its 95% confidence interval (95% CI) was calculated as

$$95\%\text{CI} = 1.96 \cdot \sqrt{\hat{V}(T)} \text{ where } \hat{V}(T) = \sum_{k=1} \hat{V}(T_k). \quad 14$$

RESULTS

HOUSEHOLD SELECTION AND SURVEY

The Kuskokwim Area results reported here include communities located along Kuskokwim River, Kongiganak and the South Kuskokwim Bay communities. The Bering Sea Coast communities and North Kuskokwim Bay communities of Kipnuk and Kwigillingok were not part of the voluntary survey process and estimates of their harvests were not otherwise possible; therefore, no data are reported for those communities.

Bethel subsistence surveys were conducted by ONC from October through December, 2010. ONC contacted 1,015 (49%) of 2,043 households (Appendix A1). Aniak subsistence surveys were conducted by KNA from October through December, 2010. KNA contacted 169 (89%) of 190 households (Appendix A1). In 2010, door-to-door surveys began the first week of October and were completed by ADF&G in all intended communities from lower to upper river: Eek, Tuntutuliak, Napakiak, Napaskiak, Oscarville, Nunapitchuk, Atmautluak, Kwethluk, Akiak, Akiachak, Tuluksak, Kasigluk, Lower Kalskag, Upper Kalskag, Chuathbaluk, Crooked Creek, Red Devil, Sleetmute, Stony River, McGrath, and Nikolai. For North and South Kuskokwim Bay: Kongiganak, Goodnews Bay, Platinum, and Quinhagak were surveyed. Overall, ADF&G contacted 1,089 (54%) of 1,982 households. The total number of households surveyed in 2010 increased from 2009 by approximately 540 households as a result of increased accuracy and efficiency updating household lists, staff training, and use of maps. Overall, 27 of 38 communities were surveyed door-to-door in 2010 (Table 2). Data entry of all surveys collected was completed near the end of March 2011.

In 2010 an error that occurred during the creation of the surveyor household lists caused unintentional sorting of a column flagging households that were selected for the survey, based on the sampling design. The effect of this error was that all the ‘yes’ and ‘no’ selection labels were randomly sorted again in the communities with random stratified sampling protocol, so the surveyors did not have an accurate list of who was originally intended to be selected for survey

according to the sampling design. This meant there was no way of knowing whether the intended proportions of each user group were selected after the sorting error occurred. The overall result was that by chance, nearly half as many households *'not selected'* for survey were interviewed as those originally 'selected'. The "unknown" stratum should have been a census (100% sample), but only 44% of households in this group were actually interviewed, due to the error. However, any household not on the list or new to the area was interviewed by the surveyors when possible, which increased the sample size of the "unknown" user group to 53%. Overall 2,273 households of a total of 4,215 (54%) were sampled in 2010 (Table 2 and Appendix A1).

HARVEST ESTIMATES

In 2010, the total estimated salmon harvests by species for the Kuskokwim area (in communities for which estimates could be made) were, with 95% confidence intervals: 69,242 (66,571 to 71,913) Chinook; 47,885 (45,193 to 50,577) chum; 41,042 (38,995 to 43,089) sockeye; 34,169 (31,861 to 36,477) coho; and 758 (592 to 924) pink salmon (Table 2, Appendices B1–B5). Overall 193,096 salmon were harvested in 2010, which is just under 5,000 fewer salmon than were harvested in 2009.

The household harvests listed above *include* salmon that were retained for subsistence use from commercial fishing. These salmon retained for subsistence use were most commonly reported in the areas with more prevalent commercial fishing, including North and South Kuskokwim Bay and the lower Kuskokwim River, and the most commonly kept species from these commercial harvests were chum and sockeye salmon (Appendix G1).

PRIMARY FISHING GEAR

In 2010, the majority (85%) of fisherman throughout the Kuskokwim Area reported that the primary gear type used for subsistence salmon fishing was drift gillnets. This was a 10% increase over 2009 (Appendix C2).

ESTIMATED FISHING HOUSEHOLDS, COMMUNITY POPULATION SIZE, AND HOUSEHOLDS RECEIVING SALMON

In 2010, we estimated that 2,699 households subsistence fished for salmon (Appendix A3). The total estimated number of people living in surveyed communities of the Kuskokwim area in 2010 was 15,536 +/- 206, an increase of less than 1% from 2009 (Appendix A4).

While the concept of "sharing" has many and varied definitions, sharing here is defined as the immediate distribution of salmon upon harvest to households outside of one's subsistence salmon harvest and processing work group. A total of 2,082 households reported receiving 2,155 Chinook; 1,245 chum; 1,163 sockeye; and 1,025 coho; and 15 pink salmon from subsistence fisherman, commercial fishermen, and the local Bethel test fishery (Appendix C1), with the majority of fish being received from subsistence fishermen.

SUBSISTENCE USE OF SALMON FOR DOG FOOD

In response to the question about owning dogs, 2,049 people responded and 60% of respondents reported owning dogs. Of households with dogs, the average number of dogs per household was 2.2. The number of households reported feeding whole salmon to dogs was 71 (or 5.6 % of dog owners), and among these households an average of 91 salmon per household were fed to dogs. (Appendix D1).

LOST FISH

In 2010, from a total of 2,205 respondents, 4,386 salmon were reported as lost (i.e. not edible for human consumption due to spoilage, animals, etc.; Appendix E1). Out of the 112 households that provided a reason for losing fish, 72% reported losing fish to weather-related reasons (e.g. "rain", "moldy", "flies", "spoiled"); 22% reported animals as the cause (responses included: e.g. "bears", "birds", "otters"); 5% of lost fish were attributed to human factors (e.g. "stolen", "freezer problems") and 4% to disease (e.g. "diseased fish").

SUBSISTENCE SALMON NEEDS

Regionwide the majority (approximately 68%) of fishing households surveyed reported meeting their subsistence harvest goals or needs for salmon, though this varied among individual communities (Appendices F1–F4).

In 2010, the majority (approximately 52%) of respondents that *did not* meet their salmon needs gave reasons of a personal nature with 16% of households citing that they did not fish as the main reason for not reaching their harvest goals. "Personal" reasons included statements describing being too busy to fish due to work or medical reasons, or comments regarding a lack of or problems with fishing equipment such as boats or fishing gear. Other examples of "personal" responses include having no freezer space to store salmon, sharing entire salmon harvest with others, and families newly arrived in the village.

In 2010 the estimated number of salmon needed was higher than the estimated number of salmon harvested by subregion and species (Appendix F5). This indicates that the unmet needs of households (described in Appendices F1 to F4) may be substantial, but further investigation would be needed to qualify this observation.

REPORTED AND ESTIMATED HARVEST OF NON-SALMON SPECIES

Reported harvests of non-salmon species (unexpanded totals) in the Kuskokwim area included 14,200 humpback and 7,940 broad whitefish; 3,907 ciscoes; 2,802 sheefish (*Stenodus leucichthys*); 18,775 burbot (*Lota lota*); 41,166 northern pike (*Esox lucius*); 103,029 blackfish (*Dallia pectoralis*); 1,526 grayling (*Thymallus arcticus*); 4,354 char (*Salvelinus alpinus* and *S. malma*); 6,566 Pacific herring (*Clupea pallasii*); 89,325 rainbow smelt (*Osmerus mordax*); and 762 rainbow trout (*O. mykiss*; Appendix C3). Whitefish harvests of were expanded to total harvest estimates for all communities surveyed in 2010. The estimated harvest of humpback whitefish was 30,950 fish (95% confidence interval ±3,873), and the estimated harvest of broad whitefish was 16,741 fish (95% confidence interval ±3,688; Appendix C4). For both humpback and broad whitefish, the estimated harvest of these species was less than the estimated 2009 harvest.

DISCUSSION

HARVEST ESTIMATES

There are many factors affecting subsistence salmon harvests, including personal, cultural, socioeconomic, environmental, and salmon run dynamics. From 2007 to 2010, Chinook salmon abundance in the Kuskokwim area was below average. Furthermore, estimated Chinook salmon escapement was even lower in 2010 than the three previous years; escapement goals were not met at Tuluksak and Kwethluk rivers, and Chinook escapements to other Kuskokwim River tributaries were some of the lowest on record. In 2010 the total harvest of all primary subsistence

salmon species in the Kuskokwim Area was only slightly lower than the total harvest in 2009 (a difference of 4,827 fish), but the total subsistence harvest of Chinook salmon in 2010 was smaller by 12,858 fish than in 2009. Compared with the most recent 5-year averages (2005 to 2009), harvest of all primary subsistence salmon species was low: Chinook salmon harvest was 27% lower; chum harvest was 30% lower; and sockeye and coho harvests were 15% lower than the respective 5-year averages (Appendices H1 to H4). However, these differences cannot be attributed solely, or even directly, to abundance, and determining the specific causes of changing harvest levels is not possible within the scope of this study.

Bias among surveyors may exist, and this bias is not measured or quantified in this study. For the results reported here for 2010, it is unclear whether the estimates may be biased. Precision of most estimates was acceptable, and was better in some cases than in 2009. The 95% confidence intervals in 2010 ranged from 4% of the estimate for Chinook to 7% of the estimate for coho, whereas in 2009, the 29% confidence intervals ranged from 5.7% for Chinook, to 14% of the estimate for coho salmon. The pink salmon harvest estimate was less precise, with a 95% confidence interval at 22% of the estimate, but this is attributed to far fewer people reporting harvest of pink salmon, which are not a primary subsistence salmon species in the Kuskokwim Area.

We analyzed the possible effects of the sorting error that resulted in misidentification of households selected for surveys. Though this problem caused a gross deviation from intended protocol, the overall effect may have been neutral. The sorting of households, while not according to protocol, was still random and did not select households with any detectable bias. The surveyors followed correct procedures and only interviewed those households that were selected for survey on their lists, so even though the lists were not generated correctly, the surveyors did not add bias by attempting to "correct" the lists. Also by chance, the overall sampling goals for the "does not usually harvest" and "usually harvest" strata were met or exceeded (Appendix A1). To see how surveying so many 'non-selected' households affected the Chinook salmon harvest estimate, the household selection lists were corrected after the survey, and survey data from 'non-selected' and 'selected' households were compared. The estimated harvest of combined non-selected and selected households was 69,161 fish, and the estimated harvest of only selected households was 69,737 fish. This difference was less than 1%; however, as expected, precision suffered when only selected households were included in the estimate. The confidence interval for estimated harvest of selected households only was nearly twice as large as that of the selected and non-selected households, but the level of precision remained within acceptable limits. Therefore, for the purposes of this report, all survey data was used whether households were originally intended for selection or not. Effort has been made to create protocols that would avoid this sorting error in future; households that are selected for survey in the database and included on surveyors' lists are double-checked against the database before data collection begins.

ESTIMATED NUMBER OF PEOPLE, SUBSISTENCE FISHERMEN, HARVEST SHARING AND NEEDS

There are several inseason and postseason methods for evaluation of salmon runs and whether fishermen are meeting their subsistence needs. Fishery managers have routinely maintained communications with fishermen to obtain information on fishing success in communities, particularly through the Kuskokwim River Salmon Management Working Group meeting process which provides fishermen in the entire Kuskokwim River drainage the opportunity to

discuss the salmon run and their harvests via teleconference (Brodersen and Carroll 2011). During these Working Group meetings, people will discuss their weekly success with salmon harvests, how they feel the runs are progressing, and other information. Similarly, the Lower Kuskokwim River inseason subsistence catch monitoring project collects data on subsistence fishermen's assessment of relative salmon run timing and abundance, whether or not fishermen are achieving their harvest goals, and other factors affecting their harvests. Reports are given weekly during the fishing season at the Working Group meetings (Dull and Shelden 2007). These methods of assessing harvest success are valuable for run management inseason, but they are entirely qualitative and do not provide harvest estimates, and not all subregions of the Kuskokwim Area are represented. For this reason, the postseason subsistence harvest survey program is invaluable to gaining a more complete picture of the salmon harvest for the whole Kuskokwim Area each year, though the data is not available until long after the fishing season ends.

One method for assessing the relative success of Kuskokwim Area fishermen postseason is to compare the annual estimated subsistence harvest to the ANS harvest ranges established by the BOF. The ANS ranges represent the needs of all subsistence users drainagewide and do not necessarily reflect the needs of specific individuals, communities, or sections of the drainage. In 2010, despite slightly lower harvests overall than 2009, all salmon harvests in the Kuskokwim River fell within the ANS ranges for that area. For the Kuskokwim Bay, which falls under 'remainder of the Kuskokwim Area' (5 AAC 01.286), the ANS range is expressed in total number of salmon: 7,500 to 13,000 and the salmon harvests in 2010 fell within the range.

While comparisons of the annual drainagewide harvest with ANS provides insight into the relative success of all fishermen, the survey results are unique in breaking down percent needs met by species and community (Appendices F1 to F4). The data may provide a postseason assessment of the season's run strength, as ideally a strong run would be reflected in a strong subsistence harvest, with a higher percent needs met. However, it has been observed in other areas, such as the Yukon River drainage that approximately 20–30% of households report their needs were not met even in years with relatively good escapement (Borba and Hamner 2001; Jallen and Hamazaki 2011). Subsistence research has repeated this observation in numerous studies, and it has been found that 20–30% of households in kinship-based subsistence economies could be expected to fail to produce enough food to feed themselves (Wolfe et al. 2007; Andrews 1988; Magdanz et al. 2002; Sahlins 1972; Sumida 1989; Sumida and Andersen 1990; and Wolfe 1987). In 2010 13% to 22% of fishing households in the Kuskokwim area reported not meeting their harvest needs, for salmon, varying by species (Appendices F1 to F4).

In 2010, households that reported not meeting their needs listed mainly "personal reasons" or "not fishing" as to why they didn't meet their needs. Only 13% of people cited run dynamics as a reason for not meeting their salmon needs, and less than 1% reported any reason related to salmon management. Therefore it may be assumed that in 2010, medical reasons, personal family issues, being too busy, having boat or motor issues, or having to work are the most common factors, other than simply not fishing, that affected people's ability to meet their needs.

The access to salmon as one travels further upriver is likely lower; harvester reports indicate salmon catchability decreases in the middle and upper river portions of the Kuskokwim drainage (Brodersen and Carroll 2011). This is reflected in the fact that approximately 85% of the total harvest comes from the lower river, where approximately 80% of the households are situated. These lower river residents have access to the salmon run early and while it is most abundant, but once this large proportion of harvest is removed, and the fish travel further distances to the

middle and upper sections of the river and escape into tributaries, they become more sparsely distributed. This can make them harder to catch, so residents further upriver may need to put more effort into achieving their harvest goals, and may be less able to reliably achieve their goals. One might assume that upper river households may be less likely to completely meet their needs than the middle river communities, but this varied among species and years (Appendices F1 to F4). Some individual communities and households may have a harder time meeting goals, which could be an effect of location, as well as other factors affecting harvest success discussed above.

The total number of fish calculated as "usually harvested" or "needed" in 2010 was consistently higher than what was *harvested* in 2010. However there are limitations to what this data can be used for, as there are confounding factors affecting the estimation of the amount of salmon "needed". For instance, households may use or would like to harvest salmon for subsistence use, but may not be able to fish for themselves, for example because they have physical or economic restrictions such as being elderly, or have no access to a boat or nets. Regardless of their ability to fish, these households may still have a *need* for salmon. People who do not fish rely on receiving fish from family, friends, and others who harvest salmon. Fish are generally given to them throughout the winter as the need arises. At the time of survey, it may be hard for non-fishers to assess whether their needs are met because they may not have received their fish yet, or may not know if what they have received will last them the winter. What confounds this further is that fishing families that generally harvest fish to share with others will often factor in those extra fish that they harvest to give away, when reporting their needs for the year. The receivers of those fish will also report how many they need, so it is likely there is double-counting of fish 'needed' (Appendix F5).

Furthermore, it may be difficult to quantify the number of fish a household receives, as it is often transferred as processed or cooked salmon among households, not as whole fish (Jallen and Hamazaki 2011). A confounding factor for those with subsistence salmon needs, is that perception of whether needs are met or not, may not necessarily relate to an exact number of fish, but more how the fishing season went for the family. Or it could be that what a family needs in one year is not the same as it needs in another year. Also, the relative proportions of different species could account for needs being met, i.e., if a household intends to harvest X amount of Chinook, but catches more chum or sockeye salmon while targeting Chinook, they may process those other species, and once their rack is full, they may not harvest more Chinook to increase the total catch for that "preferred" species. For all of the reasons discussed above, using the proportion of households that met their harvest needs to draw conclusions about the *amount* of salmon harvested may be of little value.

Though the qualitative data about whether or not people met their needs does not describe the experiences from individual households within and among subregions, it indicates that despite changes in levels of subsistence harvest, that majority of respondents were able to meet their subsistence salmon needs in 2010. But it is important to reiterate that in a given year, the number of salmon caught and the number of salmon needed may fluctuate naturally, and it is not possible to ascertain why these fluctuations occur, certainly not within the scope of this study.

REPORTED AND ESTIMATED HARVEST OF NON-SALMON SPECIES

The reported values for non-salmon species should not be compared among years, because they are not expanded estimates, and thus the amounts harvested are greatly affected by the number of people surveyed. The harvest of most whitefish, pike, blackfish and other non-salmon species

usually occurs in fall, winter and spring, many months prior to the salmon season and the survey period. Not only may it be hard for fishermen to remember specific harvests of these fish, but they may not know exactly how many of each species they caught, or may not be familiar with the names of the species. To help offset this, beginning in 2009, surveyors used color photos of the species of fish, labeled with Yup'ik names, when asking the question about harvest of non-salmon species. Though this helped people know which species surveyors were referring to, it may not help with estimation of specific harvest totals overall. The non-salmon harvest answers that respondents give often seem less specific or accurate than salmon harvests, which have more recently occurred and usually happen over a shorter period of time, and involve smaller numbers of fish. For example, people who harvest blackfish or smelt, which are small, may harvest them by the bucketful and the surveyors are trained to help respondents to try to estimate numbers of fish. Therefore the precision of these estimates are not as good as those for salmon, for which people often remember the exact number of each species they harvested (particularly if they recorded their daily catch on a harvest calendar.

LOST FISH

The question about lost fish may seem intrusive to some users who often pride themselves on their harvest practices and preservation techniques. Respondents may feel that if any fish were lost, it will be perceived as wasted, so the question was always asked with sensitivity. Often, fish that have spoiled, or have been partially eaten by animals, are fed to dogs. Households may go out and fish for more salmon to replace lost fish, but this was verified when surveying, and extra harvest to replace lost fish was accounted for in the overall harvest estimate. In 2010, a slightly higher percentage of respondents (5%) indicated losing salmon for human consumption, with 72% of the respondents citing weather-related factors and 22% of respondents citing animals as the cause for the losses. The total amount of lost fish reported was 2% of the total salmon harvest (a 1% increase of salmon lost the previous year) and fish were reported lost in most communities surveyed. Because the fish 'lost' are reported and not expanded to the entire community, comparisons of total number of lost fish should be avoided between years, as they are affected by the number of households interviewed and the number of households responding to the question regarding harvest of non-salmon species.

The main objective of this study was to estimate subsistence salmon harvest (via postseason household surveys) for all participating communities within the Kuskokwim Area, and this objective was met in 2010 with sample sizes, estimate precision and efficiency of project operations improving further from those in the 2008 and 2009 seasons.

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TABLES AND FIGURES

Table 1.–Kuskokwim area communities by geographic location.

North Kuskokwim Bay	Kipnuk*
	Kwigillingok*
	Kongiganak
Lower Kuskokwim	Tuntutuliak
	Eek
	Kasigluk
	Nunapitchuk
	Atmautluak
	Napakiak
	Napaskiak
	Oscarville
	Bethel
	Kwethluk
	Akiachak
	Akiak
	Tuluksak
Middle Kuskokwim	Lower Kalskag
	Upper Kalskag
	Aniak
	Chuathbaluk
Upper Kuskokwim	Crooked Creek
	Red Devil
	Sleetmute
	Stony River
	Lime Village
	McGrath
	Takotna
	Nikolai
	Telida
South Kuskokwim Bay	Quinhagak
	Goodnews Bay
	Platinum
Bering Sea Coast	Mekoryuk*
	Newtok*
	Nightmute*
	Toksook Bay*
	Tununak*
	Chefornak*

Note: An asterisk means that the community was not surveyed because they chose to not participate in the study.

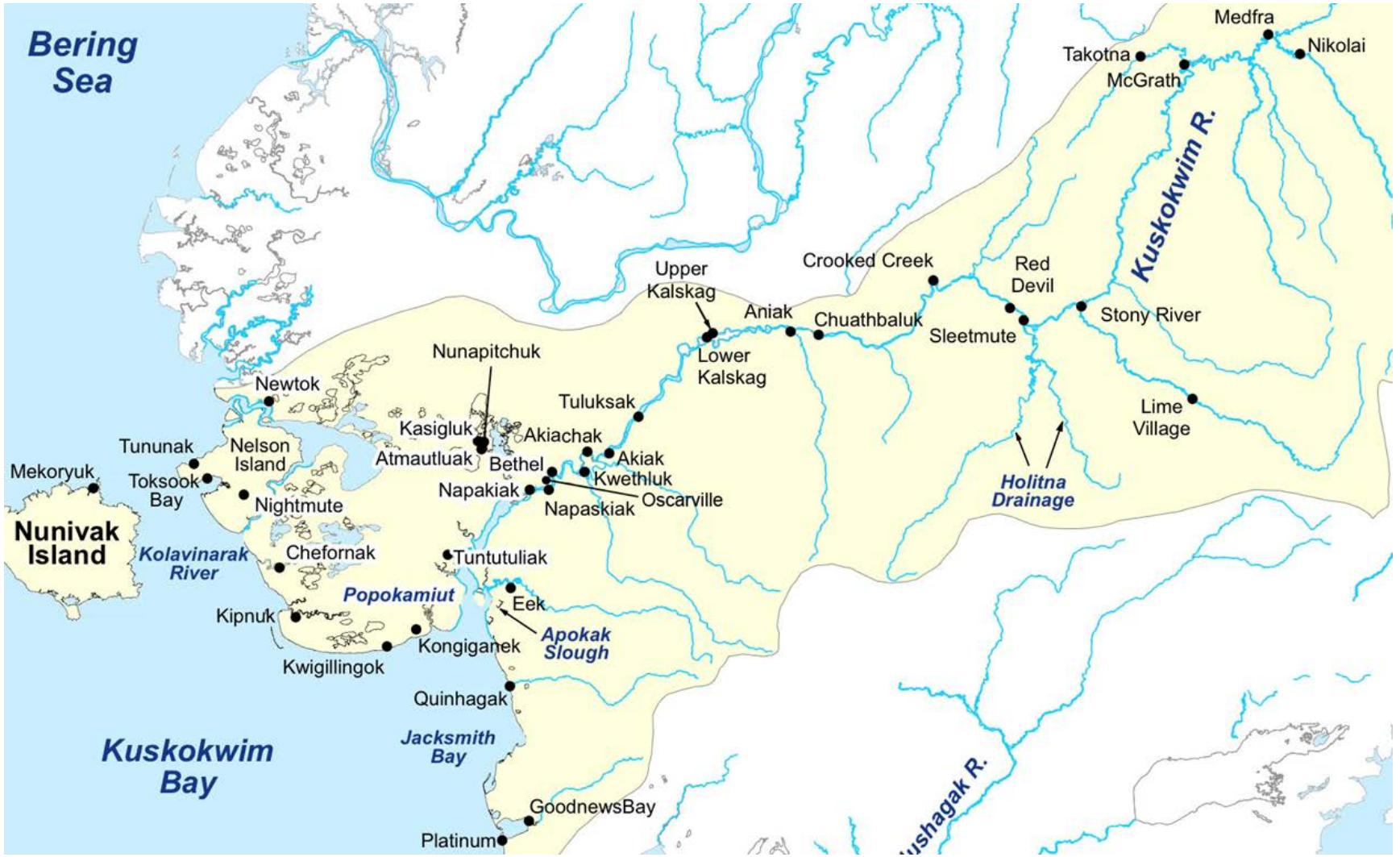

Figure 1.–Kuskokwim management area showing communities.

Date of Survey
Person Interviewed _____
Relation to HH _____

Interviewer _____

2010 Kuskokwim Area Post-Season Subsistence Salmon Harvest Survey
CONFIDENTIAL INFORMATION

1. **We would like to make sure we have the correct name and address for your household.**

Head of Household _____
Mailing Address _____Telephone _____
Permanent Note _____ _____
Significant Other _____ _____

2. **How many people live in your household?** _____
3. **Did anyone in your household harvest salmon for subsistence use OR keep fish for subsistence use from commercial fishing?** Yes ____ No ____ (Salmon caught during commercial openings but retained for subsistence. Harvest includes catching or cutting salmon) IF YES, COMPLETE ALL OF PART I, otherwise go to PART II.

Adult household member declined to be interviewed. [ ] Reason given: _____

I. HOUSEHOLDS THAT CAUGHT SALMON

4. **May I have your salmon catch calendar?** Yes ____ No ____ Already sent in ____ (Are all fish harvested on calendar?)
5. **How many total salmon did you or your fishing group harvest this year?** (Group may include other households)

CHINOOK SOCKEYE CHUM COHO PINK

6. **How many households help catch these fish?** _____ (Names) _____

*7. **Where did you catch your salmon? How many salmon did YOUR HOUSEHOLD keep for subsistence purposes?**
(Include only fish caught by this household, not the group, includes fish kept from commercial periods.)

Kusko mouth up to include bethel **(K1)** Above Bethel up to include Aniak **(K2)** Above Jacksmith Bay up to mouth **(K4)**

Below Jacksmith Bay **(K 5)** Nelson Is. above Kolavinarak River **(N)** Nelson Is. below Kokav.River to Kusko mouth **(S)**

Crooked Cr. ↓ Sleetmute ↓ Holitna R. **Stony R. ↓ McGrath ↓ Above McGrath Other**_____

Area _____ CHINOOK _____ SOCKEYE _____ CHUM _____ COHO _____ PINK _____

Area _____ CHINOOK _____ SOCKEYE _____ CHUM _____ COHO _____ PINK _____

Total (two areas) CHINOOK _____ SOCKEYE _____ CHUM _____ COHO _____ PINK _____

8. **What is your household's primary type of salmon fishing gear?** (In order of importance, 1= primary)

SET NET _____ DRIFT NET _____ FISH WHEEL _____ HOOK & LINE _____ DIPNET _____ OTHER _____

9. **How many fish were kept from commercial fishing for subsistence use? (** ___ Did not commercial fish)

CHINOOK SOCKEYE CHUM COHO PINK

10. **Did your household "lose" any salmon? (e.g. to bears, birds, flies, spoilage, diseased fish, etc.)**
(If fish was not fit for humans but was fed to dogs, then it was not "lost.")

CHINOOK _____ SOCKEYE_____ CHUM _____ COHO _____ PINK _____

Reason(s) for loss: _____

11. **Did your household give away any salmon to other households?** (names, species, and numbers)

_____

Figure 2.–Kuskokwim area postseason subsistence salmon harvest survey form, 2010.

II. ALL HOUSEHOLDS

15. Did your household catch any other fish besides salmon? Yes _____ No _____
(Harvest numbers should include from September/October of last year to now. Large Whitefish are 4 pounds or greater.)

LG WHITEFISH _____ SM WHITEFISH _____ SHEEFISH _____ BURBOT _____ PIKE _____ BLACKFISH _____

GRAYLING _____ SMELT _____ CHAR _____ RAINBOW TROUT _____ HERRING _____

****16. Was your household given any salmon? Yes ____ No ____** Code: S=Subsistence, C=Commercial, T=Test Fish

Code: _____ Fishermen/Project (Name) _____

CHINOOK _____ SOCKEYE _____ CHUM _____ COHO _____ PINK _____

Code: _____ Fishermen/Project (Name) _____

CHINOOK _____ SOCKEYE _____ CHUM _____ COHO _____ PINK _____

17. How many dogs (including puppies) does your household have? _____ (if "No" on questions 3 and 16 go to question 22)

18. Do you feed whole salmon to your dogs? Yes _____ No _____ Only Feed Scraps ____ (if "No" go to question 21)

19. Were any of the salmon put up for the dogs from the commercial fishery? Yes _____ No _____

20. Estimate harvest of salmon put up for dogs this year by fishery (numbers should represent whole fish, not scraps):

(subsistence) CHINOOK _____ SOCKEYE _____ CHUM _____ COHO _____ PINK _____

(commercial) CHINOOK _____ SOCKEYE _____ CHUM _____ COHO _____ PINK _____

21. How successful was your household in meeting its subsistence salmon needs? (indicate percent success with "x")
"No Need" means there was no harvest or use of a species because there was no need for the species, e.g. species may not be traditionally fished in that area or respondent may not wish to harvest the species.

(No Need)

- ☐ CHINOOK ___(100%) ___(75%) ___ (50%) ___(25%) ___(0%) If poor, why? _____
- ☐ SOCKEYE ___(100%) ___(75%) ___ (50%) ___(25%) ___(0%) If poor, why? _____
- ☐ CHUM ___(100%) ___(75%) ___ (50%) ___(25%) ___(0%) If poor, why? _____
- ☐ COHO ___(100%) ___(75%) ___ (50%) ___(25%) ___(0%) If poor, why? _____

22. Additional Comments: _____

_____

_____

_____

_____

THANK YOU! THIS INFORMATION IS USED TO DOCUMENT THE SUBSISTENCE SALMON HARVEST WITHIN THE KUSKOKWIM AREA AND TO TRY TO ENSURE THERE WILL BE ENOUGH SALMON FOR THE FUTURE.

Surveyor Comments:

Official Use - This area is to be filled in by Fish and Game.

HOUSEHOLD'S TOTAL SUBSISTENCE SALMON CATCH (Totals from question *7)

CHINOOK _____ SOCKEYE _____ CHUM _____ COHO _____ PINK _____

HOUSEHOLD'S TOTAL SUBSISTENCE SALMON USE (Add totals from questions **11 and **16)

CHINOOK _____ SOCKEYE _____ CHUM _____ COHO _____ PINK _____

Complete Survey _____ Partial Survey _____ No Survey _____

Figure 2.–Page 2 of 2.

APPENDIX A: DEMOGRAPHICS

Appendix A1.–Total number of Households (*N*), number selected for survey (S), number selected and surveyed (ns), number of unselected houses that were surveyed (U) and the proportion of selected households surveyed (PS), by random stratification of user groups in communities surveyed, Kuskokwim area, 2010.

	Unknown					Does Not Usually Harvest					Usually Harvest					Combined Use Groups				
Community	N	S	ns	U	PS	N	S	ns	U	PS	N	S	ns	U	PS	N	S	ns	U	PS
Kongiganak	12	5	2	3	40%	10	10	4	0	40%	75	37	19	15	51%	97	52	25	18	48%
N. Kuskokwim Bay	12	5	2	3	40%	10	10	4	0	40%	75	37	19	15	51%	97	52	25	18	48%
Tuntutuliak	13	7	2	6	29%	6	6	4	0	67%	69	35	16	21	46%	88	48	22	27	46%
Eek	7	1	0	5	0%	10	4	1	0	25%	64	33	15	16	45%	81	38	16	21	42%
Kasigluk	23	16	7	5	44%	6	6	4	0	67%	71	37	13	17	35%	100	59	24	22	41%
Nunapitchuk	15	4	4	4	100%	12	4	3	6	75%	91	45	27	31	60%	118	53	34	41	64%
Atmautluak	7	5	3	0	60%	5	5	1	0	20%	49	25	16	15	64%	61	35	20	15	57%
Napakiak	14	11	4	2	36%	3	3	2	0	67%	81	41	21	24	51%	98	55	27	26	49%
Napaskiak	4	0	0	3	0%	8	8	3	0	38%	80	39	22	20	56%	92	47	25	23	53%
Oscarville	2	1	1	1	100%	0	-	-	-	-	14	14	10	0	71%	16	15	11	1	73%
Bethel	-	-	-	-	-	-	-	-	-	-	2,043	1,003	487	528	49%	2,043	1,003	487	528	49%
Kwethluk	25	7	3	9	43%	20	7	5	4	71%	119	61	32	37	52%	164	75	40	50	53%
Akiachak	31	4	1	16	25%	12	4	2	3	50%	113	58	34	28	59%	156	66	37	47	56%
Akiak	16	9	4	4	44%	3	3	0	-	0%	68	34	14	18	41%	87	46	18	22	39%
Tuluksak	16	10	3	4	30%	7	7	1	0	14%	65	34	17	17	50%	88	51	21	21	41%
Lower Kuskokwim	173	75	32	59	43%	92	57	26	13	46%	2,927	1,459	724	772	50%	3,192	1,591	782	844	49%
Lower Kalskag	5	1	1	2	100%	14	5	4	5	80%	49	23	7	11	30%	68	29	12	18	41%
Upper Kalskag	10	5	2	1	40%	7	7	4	0	57%	50	25	14	15	56%	67	37	20	16	54%
Aniak	-	-	-	-	-	-	-	-	-	-	190	190	169	0	89%	190	190	169	0	89%
Chuathbaluk	6	3	3	3	100%	3	3	0	-	0%	28	28	22	0	79%	37	34	25	3	74%
Middle Kuskokwim	21	9	6	6	67%	24	15	8	5	53%	317	266	212	26	80%	362	290	226	37	78%

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Appendix A1.–Page 2 of 2.

	Unknown					Does Not Usually Harvest					Usually Harvest					Combined Use Groups				
Community	N	S	ns	U	PS	N	S	ns	U	PS	N	S	ns	U	PS	N	S	ns	U	PS
Crooked Creek	6	3	2	0	67%	7	7	5	0	71%	28	14	10	11	71%	41	24	17	11	71%
Red Devil	2	1	1	1	100%	3	3	2	0	67%	8	8	7	0	88%	13	12	10	1	83%
Sleetmute	9	4	2	4	50%	6	6	5	0	83%	25	25	20	0	80%	40	35	27	4	77%
Stony River	7	2	2	5	100%	1	1	0	-	0%	13	13	9	0	69%	21	16	11	5	69%
Lime Village	7	7	0	-	0%	1	1	0	-	0%	7	7	0	-	0%	15	15	0	-	0%
McGrath	30	21	10	8	48%	29	10	7	11	70%	72	38	21	18	55%	131	69	38	37	55%
Takotna	11	11	0	-	0%	7	7	0	-	0%	7	7	0	-	0%	25	25	0	-	0%
Nikolai	5	3	3	2	100%	4	4	4	0	100%	24	24	23	0	96%	33	31	30	2	97%
Telida	-	-	-	-	-	1	1	0	-	0%	1	1	0	-	0%	2	2	0	-	0%
Upper Kuskokwim	77	52	20	20	38%	59	40	23	11	58%	185	137	90	29	66%	321	229	133	60	58%
Kuskokwim River Total	283	141	60	88	43%	185	122	61	29	50%	3,504	1,791	951	936	53%	3,972	2,054	1,072	1,053	52%
Quinhagak	29	11	7	8	64%	9	9	5	0	56%	117	60	35	36	58%	155	80	47	44	59%
Goodnews Bay	6	2	1	3	50%	7	7	5	0	71%	57	29	21	12	72%	70	38	27	15	71%
Platinum	1	0	0	1	0%	3	3	2	0	67%	14	14	12	0	86%	18	17	14	1	82%
S. Kuskokwim Bay	36	13	8	12	62%	19	19	12	0	63%	188	103	68	48	66%	243	135	88	60	65%
TOTAL	319	154	68	100	44%	204	141	73	29	52%	3,692	2,002	1,113	890	56%	4,215	2,297	1,254	1,019	55%

Note: Kuskokwim River Total includes Lower, Middle and Upper Kuskokwim regions and North Kuskokwim Bay. For the Unknown user group, the number selected (S) should be equal to 100% of the unknown households in 2009, but total N in 2010 will be higher than column 'S' as surveyors discover new households when they arrive in the village, and those households are automatically 'Unknown' and are sampled if possible. In contrast the use group designations do not reflect changes found in the current year for 'usually fish' and 'usually do not fish' households; changes in those use groups will appear in 2011, when the families database is rolled over and selections are made prior to surveying in that season. In 2010 a preseason sorting error caused some unselected households to appear selected for survey, see explanation in Results section of this report. Data is unavailable for cells with dashes. In Aniak, households are not stratified by user group because a census sample is attempted each year.

Appendix A2.–Estimated number of households that subsistence fished in communities surveyed, Kuskokwim area, 2010.

	Unknown				Does Not Usually Harvest				Usually Harvest				Combined use groups			
Community	N	n	Propn.	SE	N	n	Propn.	SE	N	n	Propn.	SE	Total N	total n	Est. Total	CI (95%)
Kongiganak	12	5	40%	0.2	10	4	0%	0.0	75	37	76%	0.1	97	46	62	7
N. Kuskokwim Bay	12	5	40%	0.2	10	4	0%	0.0	75	37	76%	0.1	97	46	62	7
Tuntutuliak	13	8	63%	0.1	6	4	0%	0.0	69	37	92%	0.0	88	49	72	4
Eek	7	5	60%	0.1	10	1	100%	-	64	31	81%	0.1	81	37	66	6
Kasigluk	23	12	75%	0.1	6	4	75%	0.1	71	30	73%	0.1	100	46	74	8
Nunapitchuk	15	8	38%	0.1	12	9	56%	0.1	91	58	78%	0.0	118	75	83	6
Atmautluak	7	3	33%	0.3	5	1	0%	-	49	31	81%	0.0	61	35	42	5
Napakiak	14	6	67%	0.2	3	2	0%	0.0	81	46	63%	0.1	98	54	60	7
Napaskiak	4	3	100%	0.0	8	3	33%	0.3	80	42	88%	0.0	92	48	77	6
Oscarville	2	2	50%	0.0	-	-	-	-	14	12	83%	0.0	16	14	13	1
Bethel	-	-	-	-	-	-	-	-	2,043	1,013	66%	0.0	2,043	1,013	1,353	36
Kwethluk	25	12	42%	0.1	20	9	0%	0.0	119	69	77%	0.0	164	90	102	8
Akiachak	31	17	59%	0.1	12	5	40%	0.2	113	62	81%	0.0	156	84	114	9
Akiak	16	9	67%	0.1	3	0	-	-	68	32	78%	0.1	87	41	66	7
Tuluksak	16	7	86%	0.1	7	1	0%	-	65	34	74%	0.1	88	42	62	6
Lower Kuskokwim	173	92	61%	0.0	92	39	32%	0.0	2,927	1,497	70%	0.0	3,192	1,628	2,183	42
Lower Kalskag	5	3	67%	0.2	14	9	22%	0.1	49	18	61%	0.1	68	30	36	8
Upper Kalskag	10	3	0%	0.0	7	4	50%	0.2	50	29	76%	0.1	67	36	41	5
Aniak	-	-	-	-	-	-	-	-	190	169	51%	0.0	190	169	98	4
Chuathbaluk	6	6	0%	0.0	3	0	-	-	28	22	64%	0.1	37	28	19	3
Middle Kuskokwim	21	12	16%	0.1	24	13	31%	0.1	317	238	58%	0.0	362	263	195	11

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Appendix A2.–Page 2 of 2.

	Unknown				Does Not Usually Harvest				Usually Harvest				Combined use groups			
Community	N	n	Propn.	SE	N	n	Propn.	SE	N	n	Propn.	SE	Total N	total n	Est. Total	CI (95%)
Crooked Creek	6	2	0%	0.0	7	5	20%	0.1	28	21	48%	0.1	41	28	15	3
Red Devil	2	2	50%	0.0	3	2	0%	0.0	8	7	86%	0.1	13	11	8	1
Sleetmute	9	6	33%	0.1	6	5	40%	0.1	25	20	65%	0.1	40	31	22	3
Stony River	7	7	43%	0.0	1	0	-	-	13	9	67%	0.1	21	16	12	2
Lime Village	7	0	-	-	1	0	-	-	7	0	-	-	15	0	-	-
McGrath	30	18	11%	0.1	29	18	6%	0.0	72	39	26%	0.1	131	75	23	6
Takotna	11	0	-	-	7	0	-	-	7	0	-	-	25	0	-	-
Nikolai	5	5	40%	0.0	4	4	50%	0.0	24	23	61%	0.0	33	32	19	1
Telida	-	-	-	-	1	0	-	-	1	0	-	-	2	0	-	-
Upper Kuskokwim	77	40	21%	0.0	59	34	15%	0.0	185	119	46%	0.0	321	193	99	8
Kuskokwim River total	283	149	47%	0.0	185	90	25%	0.0	3,504	1,891	68%	0.0	3,972	2,130	2,538	44
Quinhagak	29	15	53%	0.1	9	5	40%	0.2	117	70	73%	0.0	155	90	104	8
Goodnews Bay	6	4	50%	0.2	7	5	20%	0.1	57	33	67%	0.1	70	42	42	6
Platinum	1	1	100%	-	3	2	50%	0.3	14	12	83%	0.0	18	15	14	2
S. Kuskokwim Bay	36	20	54%	0.1	19	12	34%	0.1	188	115	72%	0.0	243	147	161	10
Total	319	169	48%	0.0	204	102	26%	0.0	3,692	2,006	68%	0.0	4,215	2,277	2,699	45

Note: '*N*' is the total number of households, '*n*' is the number of households surveyed. Kuskokwim River Total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes. Propn. Is the estimated proportion of households from each group that fished, based on the number of households surveyed, and their responses to the question: "Did you subsistence fish?". Est. Total is the estimated number of households from all use groups that subsistence fished.

Appendix A3.–Estimated number of people living in communities surveyed, Kuskokwim area, 2010.

	Unknown				Does Not Usually Harvest				Usually Harvest				Combined use groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Kongiganak	12	5	4	1	10	4	4	1	75	33	5	0	97	42	461	43
N. Kuskokwim Bay	12	5	4	1	10	4	4	1	75	33	5	0	97	42	461	43
Tuntutuliak	13	8	3	1	6	4	4	1	69	37	5	0	88	49	378	38
Eek	7	5	3	0	10	1	1	-	64	30	4	0	81	36	276	34
Kasigluk	23	10	5	1	6	2	4	1	71	29	5	0	100	41	494	51
Nunapitchuk	15	8	4	1	12	8	2	0	91	55	5	0	118	71	546	35
Atmautluak	7	3	4	1	5	1	3	-	49	28	5	0	61	32	290	25
Napakiak	14	4	2	1	3	2	2	1	81	40	4	0	98	46	368	42
Napaskiak	4	3	4	0	8	3	3	1	80	40	5	0	92	46	454	39
Oscarville	2	2	4	0	-	-	-	-	14	10	4	1	16	12	67	12
Bethel	-	-	-	-	-	-	-	-	2,043	977	3	0	2,043	977	6,974	120
Kwethluk	25	11	3	0	20	9	4	1	119	68	5	0	164	88	732	52
Akiachak	31	16	3	0	12	4	3	1	113	58	5	0	156	78	745	49
Akiak	16	8	3	0	3	0	-	-	68	31	5	0	87	39	370	44
Tuluksak	16	5	5	1	7	1	1	-	65	34	6	0	88	40	436	50
Lower Kuskokwim	173	83	4	0	92	35	3	0	2,927	1,437	4	0	3,192	1,555	12,129	184
Lower Kalskag	5	2	2	0	14	9	2	0	49	18	4	1	68	29	219	39
Upper Kalskag	10	3	3	1	7	4	3	1	50	28	4	0	67	35	267	37
Aniak	-	-	-	-	-	-	-	-	190	161	3	0	190	161	579	17
Chuathbaluk	6	5	5	1	3	0	-	-	28	22	4	0	37	27	160	13
Middle Kuskokwim	21	10	3	1	24	13	2	0	317	229	4	0	362	252	1,225	57

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Appendix A3.–Page 2 of 2.

	Unknown				Does Not Usually Harvest				Usually Harvest				Combined use groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Crooked Creek	6	2	2	1	7	5	2	1	28	21	3	0	41	28	113	14
Red Devil	2	2	2	0	3	2	3	1	8	6	2	0	13	10	31	8
Sleetmute	9	6	2	0	6	5	1	0	25	19	3	0	40	30	102	9
Stony River	7	7	2	0	1	0	-	-	13	9	3	0	21	16	51	10
Lime Village	7	0	-	-	1	0	-	-	7	0	-	-	15	0	-	-
McGrath	30	18	2	0	29	18	2	0	72	39	3	0	131	75	306	19
Takotna	11	0	-	-	7	0	-	-	7	0	-	-	25	0	-	-
Nikolai	5	5	3	0	4	4	4	0	24	23	3	0	33	32	92	3
Telida	-	-	-	-	1	0	-	-	1	0	-	-	2	0	-	-
Upper Kuskokwim	77	40	2	0	59	34	2	0	185	117	3	0	321	191	694	28
Kuskokwim River total	283	138	3	0	185	86	3	0	3,504	1,816	4	0	3,972	2,040	14,509	199
Quinhagak	29	15	5	0	9	5	4	1	117	68	5	0	155	88	710	46
Goodnews Bay	6	4	3	1	7	5	5	1	57	32	4	0	70	41	256	27
Platinum	1	1	5	-	3	2	2	0	14	11	4	0	18	14	61	7
S. Kuskokwim Bay	36	20	5	0	19	12	4	0	188	111	4	0	243	143	1,027	53
Total	319	158	4	0	204	98	3	0	3,692	1,927	4	0	4,215	2,183	15,536	206

Note: 'N' is the total number of households, 'n' is the number of households surveyed. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Est. total is the number of people estimated to live in the area. Data is unavailable for cells with dashes.

APPENDIX B: SALMON HARVEST ESTIMATES

Appendix B1.–Estimated harvest of Chinook salmon, for communities surveyed, Kuskokwim area, 2010.

	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Kongiganak	12	5	6.4	4.9	10	4	0	0	75	35	18.6	3	97	44	1,470	389
N. Kuskokwim Bay	12	5	6.4	4.9	10	4	0	0	75	35	18.6	3	97	44	1,470	389
Tuntutuliak	13	8	14.1	4	6	4	0	0	69	37	43.8	4.3	88	49	3,205	503
Eek	7	5	11	3.8	10	1	2	-	64	30	26	4.7	81	36	1,761	509
Kasigluk	23	12	13.2	4.9	6	4	12.5	2.8	71	29	37.2	5.8	100	45	3,020	719
Nunapitchuk	15	8	5.1	1.9	12	9	9.1	2	91	58	25.9	2.6	118	75	2,548	393
Atmautluak	7	3	1.7	1.3	5	1	0	-	49	31	22	3.7	61	35	1,091	308
Napakiak	14	6	12.5	4.8	3	2	0	0	81	45	18.1	2.5	98	53	1,640	363
Napaskiak	4	3	36.7	7.8	8	3	15.3	12.1	80	40	50.6	6.4	92	46	4,313	877
Oscarville	2	2	20	0	-	-	-	-	14	12	41.3	3.9	16	14	618	96
Bethel	-	-	-	-	-	-	-	-	2,043	996	12.2	0.5	2,043	996	24,973	1,594
Kwethluk	25	12	4.8	3.2	20	9	0	0	119	69	36.3	2.8	164	90	4,445	562
Akiachak	31	17	12.6	4.1	12	5	8.4	4.6	113	61	35.2	3.1	156	83	4,470	627
Akiak	16	8	29.4	8.8	3	0	-	-	68	32	44.6	5.7	87	40	3,625	719
Tuluksak	16	7	19	5.6	7	1	0	-	65	33	27.8	5	88	41	2,110	572
Lower Kuskokwim	173	91	13.3	1.6	92	39	4.8	1.3	2,927	1,473	18.8	0.5	3,192	1,603	57,818	2,478
Lower Kalskag	5	3	2.3	1.5	14	9	1	0.5	49	18	20.5	6.2	68	30	1,030	520
Upper Kalskag	10	3	0	0	7	3	2.3	1.8	50	28	29.7	4	67	34	1,500	336
Aniak	-	-	-	-	-	-	-	-	190	168	11.6	0.7	190	168	2,212	213
Chuathbaluk	6	6	0	0	3	0	-	-	28	22	18.1	4.2	37	28	551	220
Middle Kuskokwim	21	12	0.6	0.4	24	12	1.4	0.7	317	236	16.4	1.3	362	260	5,294	674

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	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Crooked Creek	6	2	0	0	7	5	0.2	0.1	28	21	8.5	2.1	41	28	240	100
Red Devil	2	2	0.5	0	3	2	0	0	8	7	4	0.7	13	11	33	9
Sleetmute	9	6	0.7	0.4	6	5	0	0	25	20	10.7	1.7	40	31	272	71
Stony River	7	7	2.9	0	1	0	-	-	13	9	12.3	2.4	21	16	189	56
Lime Village	7	0	-	-	1	0	-	-	7	0	-	-	15	0	-	-
McGrath	30	18	3.4	2.1	29	18	0	0	72	39	2.2	0.7	131	75	257	134
Takotna	11	0	-	-	7	0	-	-	7	0	-	-	25	0	-	-
Nikolai	5	5	18	0	4	4	2.5	0	24	23	12.6	1	33	32	402	39
Telida	-	-	-	-	1	0	-	-	1	0	-	-	2	0	-	-
Upper Kuskokwim	77	40	3.7	1.1	59	34	0.2	0	185	119	6.8	0.6	321	193	1,393	191
Kuskokwim River Total	283	148	9.8	1.1	185	89	2.8	0.7	3,504	1,863	18	0.4	3,972	2,100	65,975	2,602
Quinhagak	29	15	14.5	4.1	9	5	4	2.2	117	70	19.1	1.7	155	90	2,692	387
Goodnews Bay	6	4	5.5	2.8	7	5	1.4	0.7	57	33	7.7	1.2	70	42	480	123
Platinum	1	1	1	-	3	2	0.5	0.3	14	12	0.8	0.1	18	15	14	3
S. Kuskokwim Bay	36	20	12.7	3.3	19	12	2.5	1.1	188	115	14.3	1.1	243	147	3,186	404
TOTAL	319	168	10.2	1	204	101	2.7	0.6	3,692	1,978	17.8	0.4	4,215	2,247	69,161	2,633

Note: '*N*' is the total number of households, 'n' is the number of households surveyed. Kuskokwim River total includes Lower, Middle and Upper Kuskokwim areas and North Kuskokwim Bay. Est. Total is the estimated number of Chinook harvested by all user groups. Data is unavailable for cells with dashes.

Appendix B2.–Estimated harvest of chum salmon for communities surveyed, Kuskokwim area 2010.

	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Kongiganak	12	5	0.0	0.0	10	4	0.0	0.0	75	34	33.5	6.1	97	43	2,513	768
N. Kuskokwim Bay	12	5	0.0	0.0	10	4	0.0	0.0	75	34	33.5	6.1	97	43	2,513	768
Tuntutuliak	13	8	7.1	3.2	6	4	0.0	0.0	69	37	34.0	4.3	88	49	2,439	504
Eek	7	5	1.8	0.6	10	1	0.0	-	64	30	11.1	2.3	81	36	721	247
Kasigluk	23	12	16.3	4.1	6	4	15.0	3.5	71	29	27.3	4.4	100	45	2,403	547
Nunapitchuk	15	8	5.9	2.3	12	9	13.1	2.2	91	58	32.7	3.8	118	75	3,223	587
Atmautluak	7	3	11.7	8.8	5	1	0.0	-	49	31	27.0	3.3	61	35	1,406	290
Napakiak	14	6	4.7	2.2	3	2	0.0	0.0	81	45	21.0	4.2	98	53	1,766	570
Napaskiak	4	3	41.7	11.0	8	3	11.7	9.2	80	40	35.6	7.2	92	46	3,110	974
Oscarville	2	2	5.0	0.0	-	-	-	-	14	12	24.4	2.8	16	14	352	69
Bethel	-	-	-	-	-	-	-	-	2,043	996	5.4	0.5	2,043	996	10,986	1,526
Kwethluk	25	12	4.9	2.2	20	9	0.0	0.0	119	68	24.9	2.4	164	89	3,082	477
Akiachak	31	17	7.8	2.5	12	5	4.0	3.1	113	61	22.7	3.1	156	83	2,856	600
Akiak	16	8	20.0	5.1	3	0	-	-	68	32	11.8	2.2	87	40	1,163	293
Tuluksak	16	7	55.7	11.7	7	1	0.0	-	65	33	36.3	5.7	88	41	3,249	701
Lower Kuskokwim	173	91	14.3	1.5	92	39	4.4	1.0	2,927	1,472	11.6	0.5	3,192	1,602	36,757	2,386
Lower Kalskag	5	3	1.3	0.8	14	9	0.4	0.3	49	18	13.8	3.9	68	30	691	322
Upper Kalskag	10	3	0.0	0.0	7	3	1.3	1.0	50	28	7.7	1.1	67	34	393	97
Aniak	-	-	-	-	-	-	-	-	190	168	13.4	1.6	190	168	2,538	507
Chuathbaluk	6	6	0.0	0.0	3	0	-	-	28	22	17.5	2.1	37	28	535	107
Middle Kuskokwim	21	12	0.3	0.2	24	12	0.7	0.4	317	236	12.9	1.2	362	260	4,156	611

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	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Crooked Creek	6	2	0.0	0.0	7	5	6.0	3.2	28	21	17.8	2.8	41	28	539	139
Red Devil	2	2	1.0	0.0	3	2	0.0	0.0	8	7	15.0	2.7	13	11	122	39
Sleetmute	9	6	1.7	1.0	6	5	1.0	0.4	25	20	20.1	5.5	40	31	524	233
Stony River	7	7	0.0	0.0	1	0	-	-	13	9	24.8	12.2	21	16	338	291
Lime Village	7	0	-	-	1	0	-	-	7	0	-	-	15	0	-	-
McGrath	30	18	0.4	0.2	29	18	0.0	0.0	72	39	6.5	3.5	131	75	482	421
Takotna	11	0	-	-	7	0	-	-	7	0	-	-	25	0	-	-
Nikolai	5	5	6.8	0.0	4	4	0.0	0.0	24	23	16.9	3.1	33	32	440	126
Telida	-	-	-	-	1	0	-	-	1	0	-	-	2	0	-	-
Upper Kuskokwim	77	40	1.1	0.2	59	34	1.0	0.5	185	119	13.6	2.0	321	193	2,445	580
Kuskokwim River Total	283	148	9.6	1.0	185	89	2.7	0.5	3,504	1,861	12.3	0.5	3,972	2,098	45,872	2,638
Quinhagak	29	15	4.9	1.4	9	5	9.2	6.1	117	70	9.8	1.4	155	90	1,376	295
Goodnews Bay	6	4	3.0	1.7	7	5	0.0	0.0	57	33	5.4	1.2	70	42	324	114
Platinum	1	1	1.0	-	3	2	4.5	2.6	14	12	1.6	0.3	18	15	37	16
S. Kuskokwim Bay	36	20	4.4	1.2	19	12	5.1	2.9	188	115	7.9	0.9	243	147	1,736	315
TOTAL	319	168	9.0	0.9	204	101	2.9	0.6	3,692	1,976	12.0	0.4	4,215	2,245	47,607	2,657

Note: '*N*' is the total number of households, 'n' is the number of households surveyed. Kuskokwim River total includes Lower, Middle and Upper Kuskokwim areas and North Kuskokwim Bay. Est. Total is the estimated number of chum salmon harvested by all user groups. Data is unavailable for cells with dashes.

Appendix B3.–Estimated harvest of sockeye salmon, for communities surveyed, Kuskokwim area, 2010.

	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Kongiganak	12	5	3.0	1.5	10	4	0.0	0.0	75	35	24.1	6.0	97	44	1,842	762
N. Kuskokwim Bay	12	5	3.0	1.5	10	4	0.0	0.0	75	35	24.1	6.0	97	44	1,842	762
Tuntutuliak	13	8	10.6	3.7	6	4	0.0	0.0	69	37	28.0	3.2	88	49	2,068	375
Eek	7	5	3.0	1.1	10	1	0.0	-	64	30	19.1	5.4	81	36	1,241	587
Kasigluk	23	12	5.3	1.7	6	4	8.3	2.3	71	29	18.0	3.5	100	45	1,448	428
Nunapitchuk	15	8	2.4	0.8	12	9	5.6	1.0	91	58	19.8	2.3	118	75	1,902	348
Atmautluak	7	3	2.0	1.5	5	1	0.0	-	49	31	14.7	2.0	61	35	735	164
Napakiak	14	6	10.2	5.1	3	2	0.0	0.0	81	46	12.9	1.9	98	54	1,187	288
Napaskiak	4	3	11.0	1.6	8	3	8.3	6.6	80	40	23.4	4.9	92	46	1,979	661
Oscarville	2	2	11.0	0.0	-	-	-	-	14	12	16.3	1.3	16	14	250	33
Bethel	-	-	-	-	-	-	-	-	2,043	996	5.2	0.3	2,043	996	10,662	895
Kwethluk	25	12	3.9	1.5	20	9	0.0	0.0	119	68	20.8	2.2	164	89	2,571	436
Akiachak	31	17	5.6	2.0	12	5	2.8	2.1	113	61	19.7	2.6	156	83	2,433	493
Akiak	16	8	11.5	3.1	3	0	-	-	68	32	13.8	2.5	87	40	1,161	312
Tuluksak	16	7	50.3	11.4	7	1	0.0	-	65	33	26.6	4.2	88	41	2,534	552
Lower Kuskokwim	173	91	10.4	1.3	92	39	2.4	0.7	2,927	1,473	9.6	0.3	3,192	1,603	30,171	1,701
Lower Kalskag	5	3	2.3	1.5	14	9	0.8	0.5	49	18	9.9	3.6	68	30	507	302
Upper Kalskag	10	3	0.0	0.0	7	3	2.3	1.8	50	28	9.0	1.2	67	34	465	105
Aniak	-	-	-	-	-	-	-	-	190	168	5.6	0.4	190	168	1,055	114
Chuathbaluk	6	6	0.0	0.0	3	0	-	-	28	22	13.2	1.7	37	28	403	88
Middle Kuskokwim	21	12	0.6	0.4	24	12	1.3	0.7	317	236	7.4	0.6	362	260	2,430	342

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	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Crooked Creek	6	2	0.0	0.0	7	5	2.0	1.1	28	21	10.3	1.9	41	28	302	90
Red Devil	2	2	25.0	0.0	3	2	0.0	0.0	8	7	53.1	14.7	13	11	475	212
Sleetmute	9	6	3.5	1.4	6	5	14.0	4.0	25	20	36.4	5.9	40	31	1,024	254
Stony River	7	7	6.4	0.0	1	0	-	-	13	9	23.8	6.3	21	16	372	150
Lime Village	7	0	-	-	1	0	-	-	7	0	-	-	15	0	-	-
McGrath	30	18	0.0	0.0	29	18	0.0	0.0	72	39	8.6	3.7	131	75	622	444
Takotna	11	0	-	-	7	0	-	-	7	0	-	-	25	0	-	-
Nikolai	5	5	0.4	0.0	4	4	0.0	0.0	24	23	2.6	0.5	33	32	65	22
Telida	-	-	-	-	1	0	-	-	1	0	-	-	2	0	-	-
Upper Kuskokwim	77	40	2.2	0.2	59	34	2.0	0.5	185	119	15.4	2.0	321	193	2,860	568
Kuskokwim River Total	283	148	7.5	0.9	185	89	2.0	0.4	3,504	1,863	10.0	0.3	3,972	2,100	37,303	1,971
Quinhagak	29	15	11.4	3.6	9	5	7.2	4.8	117	69	10.9	1.4	155	89	1,671	327
Goodnews Bay	6	4	10.3	5.7	7	5	6.0	3.2	57	33	17.4	2.5	70	42	1,093	247
Platinum	1	1	37.0	-	3	2	0.0	0.0	14	12	9.8	2.3	18	15	175	56
S. Kuskokwim Bay	36	20	11.9	3.0	19	12	5.6	2.6	188	114	12.8	1.2	243	146	2,938	409
TOTAL	319	168	8.0	0.8	204	101	2.4	0.4	3,692	1,977	10.1	0.3	4,215	2,246	40,241	2,012

Note: '*N*' is the total number of households, '*n*' is the number of households surveyed. Kuskokwim River total includes Lower, Middle and Upper Kuskokwim areas and North Kuskokwim Bay. Est. Total is the estimated number of sockeye salmon harvested by all user groups. Data is unavailable for cells with dashes.

Appendix B4.–Estimated harvest of coho salmon, for surveyed communities, Kuskokwim area, 2010.

	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Kongiganak	12	5	0.0	0.0	10	4	0.0	0.0	75	35	5.2	1.4	97	44	390	173
N. Kuskokwim Bay	12	5	0.0	0.0	10	4	0.0	0.0	75	35	5.2	1.4	97	44	390	173
Tuntutuliak	13	8	1.9	1.2	6	4	0.0	0.0	69	37	9.8	1.6	88	49	698	189
Eek	7	5	0.2	0.1	10	1	0.0	-	64	30	4.9	1.1	81	36	315	122
Kasigluk	23	12	0.8	0.5	6	4	3.8	2.2	71	29	14.6	9.3	100	45	1,078	1,105
Nunapitchuk	15	8	0.5	0.3	12	9	2.4	1.2	91	57	1.7	0.4	118	74	195	61
Atmautluak	7	3	0.0	0.0	5	1	0.0	-	49	31	0.7	0.2	61	35	36	19
Napakiak	14	6	3.5	1.7	3	2	0.0	0.0	81	46	10.3	2.7	98	54	884	366
Napaskiak	4	3	3.3	1.2	8	3	0.0	0.0	80	40	12.5	2.3	92	46	1,015	307
Oscarville	2	2	0.0	0.0	-	-	-	-	14	12	0.8	0.3	16	14	12	8
Bethel	-	-	-	-	-	-	-	-	2,043	996	9.3	0.4	2,043	996	19,000	1,255
Kwethluk	25	12	3.7	1.8	20	9	0.0	0.0	119	69	12.1	4.7	164	90	1,527	939
Akiachak	31	16	13.2	7.6	12	5	0.4	0.3	113	61	6.8	1.5	156	82	1,181	480
Akiak	16	8	4.3	2.0	3	0	-	-	68	32	5.8	1.0	87	40	475	128
Tuluksak	16	7	6.3	2.7	7	1	0.0	-	65	33	3.6	0.9	88	41	337	125
Lower Kuskokwim	173	90	4.5	1.4	92	39	0.6	0.2	2,927	1,473	8.8	0.4	3,192	1,602	26,752	2,035
Lower Kalskag	5	3	1.7	0.8	14	9	0.2	0.1	49	18	1.7	0.9	68	30	96	78
Upper Kalskag	10	3	0.0	0.0	7	3	0.3	0.3	50	26	1.8	0.7	67	32	93	61
Aniak	-	-	-	-	-	-	-	-	190	167	13.0	1.6	190	167	2,472	511
Chuathbaluk	6	6	0.0	0.0	3	0	-	-	28	22	2.5	0.5	37	28	76	26
Middle Kuskokwim	21	12	0.4	0.2	24	12	0.3	0.1	317	233	8.6	1.0	362	257	2,737	520

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	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Crooked Creek	6	2	0.0	0.0	7	5	0.6	0.3	28	21	3.0	0.7	41	28	87	35
Red Devil	2	2	4.5	0.0	3	2	0.0	0.0	8	7	9.9	1.1	13	11	88	16
Sleetmute	9	6	3.0	1.4	6	5	1.0	0.4	25	20	17.0	4.3	40	31	458	183
Stony River	7	7	3.1	0.0	1	0	-	-	13	9	13.0	3.5	21	16	201	82
Lime Village	7	0	-	-	1	0	-	-	7	0	-	-	15	0	-	-
McGrath	30	18	0.0	0.0	29	18	0.3	0.2	72	39	14.5	7.2	131	75	1,053	864
Takotna	11	0	-	-	7	0	-	-	7	0	-	-	25	0	-	-
Nikolai	5	5	2.0	0.0	4	4	3.8	0.0	24	23	4.6	0.5	33	32	135	19
Telida	-	-	-	-	1	0	-	-	1	0	-	-	2	0	-	-
Upper Kuskokwim	77	40	1.2	0.2	59	34	0.7	0.1	185	119	11.2	3.1	321	193	2,021	881
Kuskokwim River Total	283	147	3.2	0.9	185	89	0.6	0.1	3,504	1,860	8.9	0.4	3,972	2,096	31,900	2,281
Quinhagak	29	15	14.6	4.8	9	5	7.8	3.4	117	70	9.0	1.4	155	90	1,547	364
Goodnews Bay	6	4	6.0	3.5	7	5	1.2	0.6	57	33	4.8	0.9	70	42	319	95
Platinum	1	1	1.0	-	3	2	0.0	0.0	14	12	14.0	1.8	18	15	197	44
S. Kuskokwim Bay	36	20	12.8	3.9	19	12	4.1	1.6	188	115	8.1	0.9	243	147	2,063	377
TOTAL	319	167	4.4	0.9	204	101	0.9	0.2	3,692	1,975	8.8	0.4	4,215	2,243	33,962	2,312

Note: '*N*' is the total number of households, 'n' is the number of households surveyed. Kuskokwim River total includes Lower, Middle and Upper Kuskokwim areas and North Kuskokwim Bay. Est. Total is the estimated number of coho salmon harvested by all user groups. Data is unavailable for cells with dashes.

Appendix B5.–Estimated harvest of pink salmon for communities surveyed, Kuskokwim area, 2010.

	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Kongiganak	12	5	0.0	0.0	10	4	0.0	0.0	75	35	0.0	0.0	97	44	0	0
N. Kuskokwim Bay	12	5	0.0	0.0	10	4	0.0	0.0	75	35	0.0	0.0	97	44	0	0
Tuntutuliak	13	8	0.3	0.2	6	4	0.0	0.0	69	37	0.1	0.0	88	49	7	5
Eek	7	5	0.0	0.0	10	1	0.0	-	64	30	0.7	0.3	81	36	47	31
Kasigluk	23	12	0.0	0.0	6	4	0.0	0.0	71	29	0.2	0.1	100	45	12	16
Nunapitchuk	15	8	0.0	0.0	12	9	0.0	0.0	91	58	0.0	0.0	118	75	0	0
Atmautluak	7	3	0.0	0.0	5	1	0.0	-	49	31	0.1	0.0	61	35	3	3
Napakiak	14	6	0.8	0.6	3	2	0.0	0.0	81	44	0.0	0.0	98	52	15	15
Napaskiak	4	3	0.0	0.0	8	3	0.0	0.0	80	41	0.2	0.1	92	47	14	8
Oscarville	2	2	0.0	0.0	-	-	-	-	14	11	0.1	0.0	16	13	1	1
Bethel	-	-	-	-	-	-	-	-	2,043	993	0.1	0.0	2,043	993	243	103
Kwethluk	25	12	0.8	0.6	20	9	0.0	0.0	119	69	0.2	0.1	164	90	50	33
Akiachak	31	17	0.0	0.0	12	5	0.0	0.0	113	60	0.5	0.3	156	82	57	52
Akiak	16	8	3.8	1.7	3	0	-	-	68	32	0.0	0.0	87	40	62	48
Tuluksak	16	7	0.0	0.0	7	1	0.0	-	65	33	0.0	0.0	88	41	0	0
Lower Kuskokwim	173	91	0.6	0.2	92	39	0.0	0.0	2,927	1,468	0.1	0.0	3,192	1,598	511	135
Lower Kalskag	5	3	0.0	0.0	14	9	0.0	0.0	49	18	0.0	0.0	68	30	0	0
Upper Kalskag	10	3	0.0	0.0	7	3	0.0	0.0	50	28	0.0	0.0	67	34	0	0
Aniak	-	-	-	-	-	-	-	-	190	168	0.1	0.0	190	168	16	7
Chuathbaluk	6	6	0.0	0.0	3	0	-	-	28	22	0.0	0.0	37	28	0	0
Middle Kuskokwim	21	12	0.0	0.0	24	12	0.0	0.0	317	236	0.0	0.0	362	260	16	7

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	Unknown				Does not usually harvest				Usually Harvest				Combined Use Groups			
Community	N	n	Mean	SE	N	n	Mean	SE	N	n	Mean	SE	Total N	total n	Est. Total	CI (95%)
Crooked Creek	6	2	0.0	0.0	7	5	0.0	0.0	28	21	0.0	0.0	41	28	0	0
Red Devil	2	2	0.0	0.0	3	2	0.0	0.0	8	6	0.0	0.0	13	10	0	0
Sleetmute	9	6	0.0	0.0	6	5	0.0	0.0	25	20	0.3	0.1	40	31	8	6
Stony River	7	7	0.0	0.0	1	0	-	-	13	9	0.0	0.0	21	16	0	0
Lime Village	7	0	-	-	1	0	-	-	7	0	-	-	15	0	-	-
McGrath	30	18	0.0	0.0	29	18	0.0	0.0	72	39	0.3	0.1	131	75	20	14
Takotna	11	0	-	-	7	0	-	-	7	0	-	-	25	0	-	-
Nikolai	5	5	0.0	0.0	4	4	0.0	0.0	24	23	0.1	0.0	33	32	3	1
Telida	-	-	-	-	1	0	-	-	1	0	-	-	2	0	-	-
Upper Kuskokwim	77	40	0.0	0.0	59	34	0.0	0.0	185	118	0.2	0.1	321	192	31	15
Kuskokwim River Total	283	148	0.4	0.1	185	89	0.0	0.0	3,504	1,857	0.1	0.0	3,972	2,094	558	136
Quinhagak	29	15	3.7	1.7	9	5	0.0	0.0	117	70	0.5	0.2	155	90	165	96
Goodnews Bay	6	4	2.5	1.4	7	5	0.0	0.0	57	33	0.3	0.1	70	42	32	18
Platinum	1	1	1.0	-	3	2	0.0	0.0	14	12	0.2	0.1	18	15	3	2
S. Kuskokwim Bay	36	20	3.4	1.4	19	12	0.0	0.0	188	115	0.4	0.1	243	147	200	97
TOTAL	319	168	0.7	0.2	204	101	0.0	0.0	3,692	1,972	0.1	0.0	4,215	2,241	758	166

Note: '*N*' is the total number of households, 'n' is the number of households surveyed. Kuskokwim River total includes Lower, Middle and Upper Kuskokwim areas and North Kuskokwim Bay. Est. Total is the estimated number of pink harvested by all user groups. Data is unavailable for cells with dashes.

APPENDIX C: ESTIMATES OF NON-SALMON SUBSISTENCE FISH HARVESTED

Appendix C1.–Number of fish reported as received from subsistence, commercial and test fisheries, Kuskokwim area, 2010.

			Received from subsistence fishermen					Received from commercial fishermen					Received from Bethel Test Fishery				
Community	N	n	Chinook	chum	coho	sockeye	pink	Chinook	chum	coho	sockeye	pink	Chinook	chum	coho	sockeye	pink
Kongiganak	97	39	94	290	192	12	0	0	0	0	0	0	0	0	0	0	0
N. Kuskokwim Bay	97	39	94	290	192	12	0	0	0	0	0	0	0	0	0	0	0
Tuntutuliak	88	47	42	2	2	5	0	0	0	0	0	0	0	0	0	0	0
Eek	81	36	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kasigluk	100	43	96	48	19	5	0	0	0	0	0	0	0	0	0	0	0
Nunapitchuk	118	67	112	70	8	6	0	0	0	0	0	0	0	0	0	0	0
Atmautluak	61	32	45	22	23	10	0	0	0	0	0	0	0	0	0	0	0
Napakiak	98	46	141	113	121	53	0	0	0	0	0	0	0	0	0	0	0
Napaskiak	92	42	4	0	0	23	0	10	0	0	0	0	0	0	0	0	0
Oscarville	16	9	5	0	0	7	0	0	0	0	0	0	0	0	0	0	0
Bethel	2,043	934	600	309	212	368	0	6	0	0	0	0	45	107	40	106	0
Kwethluk	164	86	186	84	79	75	0	0	0	0	0	0	0	0	0	0	0
Akiachak	156	71	122	11	17	17	0	0	0	0	0	0	0	0	0	0	0
Akiak	87	34	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuluksak	88	36	22	16	11	22	0	0	0	0	0	0	0	0	0	0	0
Lower Kuskokwim	3,192	1,483	1,400	675	492	591	0	16	0	0	0	0	45	107	40	106	0
Lower Kalskag	68	28	77	19	4	10	0	0	0	0	0	0	0	0	0	0	0
Upper Kalskag	67	28	45	12	15	18	0	0	0	0	0	0	0	0	0	0	0
Aniak	190	166	190	46	135	96	10	0	0	0	0	0	0	0	0	0	0
Chuathbaluk	37	22	29	7	20	8	0	0	0	0	0	0	0	0	0	0	0
Middle Kuskokwim	362	244	341	84	174	132	10	0	0	0	0	0	0	0	0	0	0

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			Received from subsistence fishermen					Received from commercial fishermen					Received from Bethel Test Fishery				
Community	N	n	Chinook	chum	coho	sockeye	pink	Chinook	chum	coho	sockeye	pink	Chinook	chum	coho	sockeye	pink
Crooked Creek	41	21	5	2	5	4	0	0	0	0	0	0	0	0	0	0	0
Red Devil	13	9	1	0	42	10	0	0	0	0	0	0	0	0	0	0	0
Sleetmute	40	27	33	0	52	7	0	0	0	0	0	0	0	0	0	0	0
Stony River	21	14	9	0	32	13	0	0	0	0	0	0	0	0	0	0	0
Lime Village	15	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
McGrath	131	74	37	5	48	27	0	0	0	0	0	0	0	0	0	0	0
Takotna	25	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nikolai	33	31	14	24	4	14	0	0	0	0	0	0	0	0	0	0	0
Telida	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim	321	176	99	31	183	75	0	0	0	0	0	0	0	0	0	0	0
Kuskokwim River Total	3,972	1,942	1,934	1,080	1,041	810	10	16	0	0	0	0	45	107	40	106	0
Quinhagak	155	86	107	29	49	94	5	0	0	0	0	0	0	0	0	0	0
Goodnews Bay	70	42	24	7	23	9	0	0	0	0	0	0	0	0	0	0	0
Platinum	18	12	5	22	0	6	0	22	0	10	0	0	2	0	0	0	0
S. Kuskokwim Bay	243	140	136	58	72	109	5	22	0	10	0	0	2	0	0	0	0
Survey Total	4,215	2,082	2,070	1,138	1,113	919	15	38	0	10	0	0	47	107	40	106	0

Note: '*N*' is the total number of households, 'n' is the number of households responding to the question about receiving fish. Data is unavailable for cells with dashes. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay.

Appendix C2.–Fishing gear indicated as the primary type used by subsistence fishermen, Kuskokwim area, 2010.

Community	N	n	Set Net	Drift Net	Fish wheel	Hook & Line
Kongiganak	97	26	-	26	-	-
N. Kuskokwim Bay	97	26	-	26	-	-
Tuntutuliak	88	34	-	34	-	-
Eek	81	29	5	24	-	-
Kasigluk	100	34	-	34	-	-
Nunapitchuk	118	48	-	48	-	-
Atmautluak	61	26	-	26	-	-
Napakiak	98	30	2	28	-	-
Napaskiak	92	41	5	36	-	-
Oscarville	16	9	1	7	-	1
Bethel	2,043	655	27	590	-	38
Kwethluk	164	58	11	46	1	-
Akiachak	156	59	4	55	-	-
Akiak	87	29	2	27	-	-
Tuluksak	88	29	1	28	-	-
Lower Kuskokwim	3,192	1,081	58	983	1	39
Lower Kalskag	68	15	1	13	-	1
Upper Kalskag	67	21	1	20	-	-
Aniak	190	86	6	61	-	19
Chuathbaluk	37	14	1	12	-	1
Middle Kuskokwim	362	136	9	106	-	21
Crooked Creek	41	11	-	10	-	1
Red Devil	13	7	5	2	-	-
Sleetmute	40	16	5	9	-	2
Stony River	21	9	-	4	1	4
Lime Village	15	-	-	-	-	-
McGrath	131	12	4	3	1	4
Takotna	25	-	-	-	-	-
Nikolai	33	18	11	1	-	6
Telida	2	-	-	-	-	-
Upper Kuskokwim	321	73	25	29	2	17
Kuskokwim River Total	3,972	1,316	92	1,144	3	77
Quinhagak	155	57	3	45	-	9
Goodnews Bay	70	24	7	16	-	1
Platinum	18	10	2	3	-	5
S. Kuskokwim Bay	243	91	12	64	-	15
Total	4,215	1,407	104	1,208	3	92

Note: '*N*' is the total number of households, '*n*' is the households responding to the question about which type of gear they primarily use. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim area and North Kuskokwim Bay. Data is unavailable for cells with dashes.

Appendix C3.–Number of non-salmon fish reported as harvested (unexpanded) including those caught in the winter prior to the survey season, Kuskokwim area, 2010.

Community	N	n	humpback w.f.	broad w.f.	cisco	sheefish	burbot	pike	blackfish	grayling	char	herring	smelt	rainbow
Kongiganak	97	36	70	30	170	26	0	232	0	0	3	3,731	132	2
N. Kuskokwim Bay	97	36	70	30	170	26	0	232	0	0	3	3,731	132	2
Tuntutuliak	88	45	695	365	46	74	644	1,817	6,390	15	0	0	550	10
Eek	81	33	240	77	440	41	696	1,278	6,440	40	35	156	50	35
Kasigluk	100	42	2,743	1,648	131	45	253	4,444	7,288	0	0	0	4,350	0
Nunapitchuk	118	66	1,114	939	728	35	197	4,391	23,670	0	10	0	1,780	0
Atmautluak	61	30	433	758	0	78	342	1,274	8,680	0	0	0	450	0
Napakiak	98	44	1,224	723	59	100	268	3,466	6,810	0	0	0	8,266	3
Napaskiak	92	40	786	283	12	64	125	2,178	7,140	18	0	0	3,525	22
Oscarville	16	11	214	43	80	40	172	300	50	0	0	0	900	0
Bethel	2,043	992	2,453	281	107	551	1,155	14,770	6,219	247	183	114	35,346	303
Kwethluk	164	85	1,267	740	216	351	958	3,349	1,155	30	30	0	4,375	43
Akiachak	156	73	557	476	109	86	432	1,460	10,725	0	0	2	5,960	15
Akiak	87	34	543	128	50	133	12,469	898	6,930	16	14	0	6,795	30
Tuluksak	88	37	310	397	68	191	305	522	392	0	12	0	7,425	0
Lower Kuskokwim	3,192	1,532	12,579	6,858	2,046	1,789	18,016	40,147	91,889	366	284	272	79,772	461
Lower Kalskag	68	29	268	55	52	85	18	97	6,650	0	0	0	4,112	1
Upper Kalskag	67	32	225	175	62	38	228	30	630	0	3	0	1,178	0
Aniak	190	165	164	248	118	180	36	156	50	73	80	0	0	39
Chuathbaluk	37	24	100	30	0	38	117	21	0	104	3	0	106	4
Middle Kuskokwim	362	250	757	508	232	341	399	304	7,330	177	86	0	5,396	44

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Community	N	n	humpback w.f.	broad w.f.	cisco	sheefish	burbot	pike	blackfish	grayling	char	herring	smelt	rainbow
Crooked Creek	41	21	65	0	0	131	151	12	0	120	0	0	0	0
Red Devil	13	10	148	15	5	21	1	54	0	95	0	0	0	0
Sleetmute	40	28	137	292	0	181	200	102	0	242	3	0	0	0
Stony River	21	16	138	85	0	50	0	10	0	25	2	0	0	0
Lime Village	15	0	-	-	-	-	-	-	-	-	-	-	-	-
McGrath	131	74	48	73	95	185	7	110	0	128	0	0	0	0
Takotna	25	0	-	-	-	-	-	-	-	-	-	-	-	-
Nikolai	33	30	123	67	242	78	1	185	0	76	2	0	0	1
Telida	2	0	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim	321	179	659	532	342	646	360	473	0	686	7	0	0	1
Kuskokwim River Total	3,972	1,997	14,065	7,928	2,790	2,802	18,775	41,156	99,219	1,229	380	4,003	85,300	508
Quinhagak	155	87	135	7	550	0	0	10	3,810	228	2,399	1,183	2,335	195
Goodnews Bay	70	42	0	5	515	0	0	0	0	40	1,359	1,360	1,065	47
Platinum	18	12	0	0	52	0	0	0	0	29	216	20	625	12
S. Kuskokwim Bay	243	141	135	12	1,117	0	0	10	3,810	297	3,974	2,563	4,025	254
Survey Total	4,215	2,138	14,200	7,940	3,907	2,802	18,775	41,166	103,029	1,526	4,354	6,566	89,325	762

Note: '*N*' is the total number of households, '*n*' is the number of households responding that they fish for non-salmon species. 'W.f' stands for whitefish. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes.

Appendix C4.–Estimated (expanded) harvest of humpback and broad whitefish, including those caught in previous winter, Kuskokwim area, 2010.

			Humpback		Broad	
Community	N	n	total	CI (95%)	total	CI (95%)
Kongiganak	97	36	194	192	83	83
N. Kuskokwim Bay	97	36	194	192	83	83
Tuntutuliak	88	45	1,453	452	754	226
Eek	81	33	604	280	194	161
Kasigluk	100	41	6,745	2,485	4,181	3,375
Nunapitchuk	118	66	1,995	511	1,686	686
Atmautluak	61	30	816	305	1,429	886
Napakiak	98	44	3,345	1,444	1,864	803
Napaskiak	92	40	1,797	1,533	662	357
Oscarville	16	9	428	513	75	82
Bethel	2,043	989	5,067	554	581	103
Kwethluk	164	84	2,409	809	1,365	492
Akiachak	156	73	1,165	680	997	324
Akiak	87	34	1,472	1,477	347	375
Tuluksak	88	35	708	312	897	337
Lower Kuskokwim	3,192	1,523	28,004	3,812	15,032	3,673
Lower Kalskag	68	29	730	554	150	100
Upper Kalskag	67	30	450	193	350	151
Aniak	190	165	189	48	287	70
Chuathbaluk	37	24	169	101	51	38
Middle Kuskokwim	362	248	1,538	580	838	192
Crooked Creek	41	21	121	100	0	0
Red Devil	13	9	237	238	24	27
Sleetmute	40	27	182	63	406	252
Stony River	21	16	209	131	126	110
Lime Village	15	0	-	-	-	-
McGrath	131	74	88	84	132	80
Takotna	25	0	-	-	-	-
Nikolai	33	29	124	2	78	22
Telida	2	0	-	-	-	-
Upper Kuskokwim	321	176	961	285	767	280
Kuskokwim River total	3,972	1,983	30,698	3,870	16,720	3,688
Quinhagak	155	86	252	145	13	11
Goodnews Bay	70	42	0	0	9	9
Platinum	18	12	0	0	0	0
S. Kuskokwim Bay	243	140	252	144	21	14
Survey Total	4,215	2,123	30,950	3,873	16,741	3,688

Note: '*N*' is the total number of households, 'n' is the number of households responding that they fish for non-salmon species. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes.

APPENDIX D: SALMON HARVESTED TO FEED DOGS

Appendix D1.–Number of people that own dogs, number reporting feeding salmon to dogs, and number of salmon fed to dogs, by species, Kuskokwim area, 2010.

Community	N	n	own dog	feed salmon	no. dogs	Chinook	Chum	Coho	Sockeye	Pink
Kongiganak	97	35	13	0	19	0	0	0	0	0
N. Kuskokwim Bay	97	35	13	0	19	0	0	0	0	0
Tuntutuliak	88	43	29	0	90	0	0	0	0	0
Eek	81	32	20	2	41	0	0	0	0	0
Kasigluk	100	37	25	3	119	17	7	332	7	0
Nunapitchuk	118	59	46	3	91	0	59	0	0	0
Atmautluak	61	27	20	0	68	0	0	0	0	0
Napakiak	98	42	32	1	67	0	10	0	0	0
Napaskiak	92	40	20	1	96	0	0	0	0	0
Oscarville	16	11	7	2	19	0	60	0	0	0
Bethel	2,043	994	597	12	952	0	667	3	0	4
Kwethluk	164	81	60	5	204	0	60	500	0	0
Akiachak	156	62	33	3	132	50	70	125	65	0
Akiak	87	31	18	2	105	0	38	0	0	12
Tuluksak	88	28	21	3	61	3	182	4	61	0
Lower Kuskokwim	3,192	1,487	928	37	2,045	70	1,153	964	133	16
Lower Kalskag	68	23	15	1	40	0	50	0	0	0
Upper Kalskag	67	25	19	0	35	0	0	0	0	0
Aniak	190	164	92	16	280	0	1,691	1,005	2	0
Chuathbaluk	37	19	14	0	25	0	0	0	0	0
Middle Kuskokwim	362	231	140	17	380	0	1,741	1,005	2	0

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Community	N	n	own dog	feed salmon	no. dogs	Chinook	Chum	Coho	Sockeye	Pink
Crooked Creek	41	16	13	3	46	0	155	0	0	0
Red Devil	13	8	5	4	13	1	50	8	5	0
Sleetmute	40	20	14	2	27	0	73	0	0	0
Stony River	21	15	10	1	22	0	0	0	0	0
Lime Village	15	0	-	-	-	-	-	-	-	-
McGrath	131	72	33	3	93	0	230	338	75	5
Takotna	25	0	-	-	-	-	-	-	-	-
Nikolai	33	27	15	2	31	0	370	6	0	0
Telida	2	0	-	-	-	-	-	-	-	-
Upper Kuskokwim	321	158	90	15	232	1	878	352	80	5
Kuskokwim River total	3,972	1,911	1,171	69	2,676	71	3,772	2,321	215	21
Quinhagak	155	86	45	2	74	0	45	10	0	25
Goodnews Bay	70	40	23	0	39	0	0	0	0	0
Platinum	18	12	7	0	13	0	0	0	0	0
S. Kuskokwim Bay	243	138	75	2	126	0	45	10	0	25
Survey Total	4,215	2,049	1,246	71	2,802	71	3,817	2,331	215	46

Note: '*N*' is the total number of households, '*n*' is the number of households that answered the question about dogs, 'no. dogs' is the total reported number of dogs. Kuskokwim River total includes lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes.

APPENDIX E: SALMON HARVEST LOST

Appendix E1.–Number of salmon, by species reported as "lost" due to spoilage, animals, etc., Kuskokwim area, 2010.

Community	N	n	Chinook	Chum	Coho	Sockeye
Kongiganak	128	41	32	49	0	80
N. Kuskokwim Bay	97	41	32	49	0	80
Tuntutuliak	88	49	223	293	0	188
Eek	81	37	27	2	0	14
Kasigluk	100	45	43	101	0	35
Nunapitchuk	118	70	173	47	22	49
Atmautluak	61	35	30	45	0	40
Napakiak	98	49	130	156	17	77
Napaskiak	92	45	60	60	0	0
Oscarville	16	11	12	17	0	8
Bethel	2,043	1,008	164	114	28	65
Kwethluk	164	88	98	118	23	45
Akiachak	156	67	0	34	7	49
Akiak	87	40	33	103	12	125
Tuluksak	88	38	212	208	0	157
Lower Kuskokwim	3,192	1,582	1,205	1,298	109	852
Lower Kalskag	68	29	35	12	2	12
Upper Kalskag	67	34	0	0	0	0
Aniak	190	161	42	32	10	10
Chuathbaluk	37	28	0	15	0	5
Middle Kuskokwim	362	252	77	59	12	27
Crooked Creek	41	28	0	0	0	15
Red Devil	13	10	0	0	8	0
Sleetmute	40	29	20	38	0	48
Stony River	21	16	5	0	0	0
Lime Village	15	0	-	-	-	-
McGrath	131	74	0	250	0	3
Takotna	25	0	-	-	-	-
Nikolai	33	31	0	0	0	0
Telida	2	0	-	-	-	-
Upper Kuskokwim	321	188	25	288	8	66
Kuskokwim River Total	3,972	2,063	1,339	1,694	129	1,025
Quinhagak	155	86	55	41	27	29
Goodnews Bay	70	41	36	0	0	11
Platinum	18	15	0	0	0	0
S. Kuskokwim Bay	243	142	91	41	27	40
Survey Total	4,215	2,205	1,430	1,735	156	1,065

Note: '*N*' is the total number of households, '*n*' is the number of households responding to the question about lost fish. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes.

APPENDIX F: SURVEY RESULTS FOR “NEEDS MET”

Appendix F1.–Estimated proportion of Chinook salmon subsistence needs met, for households that subsistence fished, Kuskokwim area, 2010.

Community	N	n	25% needs met	50% needs met	75% needs met	100% needs met
Kongiganak	97	21	29%	29%	5%	38%
N. Kuskokwim Bay	97	21	29%	29%	5%	38%
Tuntutuliak	88	36	11%	19%	22%	47%
Eek	81	26	15%	8%	4%	73%
Kasigluk	100	30	27%	13%	20%	40%
Nunapitchuk	118	44	18%	27%	7%	48%
Atmautluak	61	22	27%	14%	27%	32%
Napakiak	98	27	15%	26%	11%	48%
Napaskiak	92	37	8%	14%	5%	73%
Oscarville	16	7	29%	0%	29%	43%
Bethel	2,043	612	5%	4%	4%	87%
Kwethluk	164	55	15%	22%	20%	44%
Akiachak	156	53	17%	15%	13%	55%
Akiak	87	26	0%	4%	4%	92%
Tuluksak	88	29	17%	10%	17%	55%
Lower Kuskokwim	3,192	1,004	9%	9%	8%	74%
Lower Kalskag	68	11	64%	18%	9%	9%
Upper Kalskag	67	18	11%	17%	0%	72%
Aniak	190	76	36%	18%	9%	37%
Chuathbaluk	37	14	50%	0%	0%	50%
Middle Kuskokwim	362	119	36%	16%	7%	41%
Crooked Creek	41	11	64%	0%	18%	18%
Red Devil	13	6	50%	0%	0%	50%
Sleetmute	40	11	18%	45%	0%	36%
Stony River	21	8	13%	13%	13%	63%
Lime Village	15	-	-	-	-	-
McGrath	131	11	27%	18%	0%	55%
Takotna	25	-	-	-	-	-
Nikolai	33	15	27%	0%	0%	73%
Telida	2	-	-	-	-	-
Upper Kuskokwim	321	62	32%	13%	5%	50%
Kuskokwim River Total	3,972	1,206	14%	10%	7%	69%
Quinhagak	155	59	5%	15%	3%	76%
Goodnews Bay	70	23	35%	13%	4%	48%
Platinum	18	11	73%	18%	0%	9%
S. Kuskokwim Bay	243	93	20%	15%	3%	61%
Survey Total	4,215	1,299	14%	10%	7%	68%

Note: 'N' is the total number of households, 'n' is the number of households responding to the question about their subsistence needs. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes. Percentage is estimated by dividing the total number of fish harvested by the total respondents said were 'needed'.

Appendix F2.–Estimated proportion of chum salmon subsistence needs met, for households that subsistence fished, Kuskokwim area, 2010.

Community	N	n	25% needs met	50% needs met	75% needs met	100% needs met
Kongiganak	97	14	29%	36%	0%	36%
N. Kuskokwim Bay	97	14	29%	36%	0%	36%
Tuntutuliak	88	34	15%	9%	6%	71%
Eek	81	19	21%	5%	5%	68%
Kasigluk	100	28	18%	11%	7%	64%
Nunapitchuk	118	35	11%	11%	17%	60%
Atmautluak	61	15	0%	20%	27%	53%
Napakiak	98	23	26%	26%	4%	43%
Napaskiak	92	33	6%	12%	6%	76%
Oscarville	16	6	0%	17%	17%	67%
Bethel	2,043	285	9%	4%	3%	85%
Kwethluk	164	46	11%	24%	9%	57%
Akiachak	156	48	15%	8%	0%	77%
Akiak	87	23	4%	0%	0%	96%
Tuluksak	88	25	4%	20%	0%	76%
Lower Kuskokwim	3,192	620	10%	9%	5%	75%
Lower Kalskag	68	7	29%	43%	14%	14%
Upper Kalskag	67	15	13%	0%	7%	80%
Aniak	190	37	19%	19%	8%	54%
Chuathbaluk	37	12	8%	0%	0%	92%
Middle Kuskokwim	362	71	17%	14%	7%	62%
Crooked Creek	41	10	10%	0%	50%	40%
Red Devil	13	6	33%	0%	0%	67%
Sleetmute	40	8	0%	38%	0%	63%
Stony River	21	4	25%	0%	25%	50%
Lime Village	15	-	-	-	-	-
McGrath	131	4	50%	0%	0%	50%
Takotna	25	-	-	-	-	-
Nikolai	33	7	57%	0%	0%	43%
Telida	2	-	-	-	-	-
Upper Kuskokwim	321	39	26%	8%	15%	51%
Kuskokwim River Total	3,972	744	12%	10%	6%	72%
Quinhagak	155	42	10%	7%	5%	79%
Goodnews Bay	70	10	30%	10%	0%	60%
Platinum	18	6	67%	0%	0%	33%
S. Kuskokwim Bay	243	58	19%	7%	3%	71%
Survey Total	4,215	802	13%	10%	5%	72%

Note: '*N*' is the total number of households, '*n*' is the number of households responding to the question about their subsistence needs. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes. Percentage is estimated by dividing the total number of fish harvested by the total respondents said were 'needed'.

Appendix F3.–Estimated proportion of sockeye salmon subsistence needs met, for households that subsistence fished, Kuskokwim area, 2010.

Community	N	n	25% needs met	50% needs met	75% needs met	100% needs met
Kongiganak	97	18	28%	22%	6%	44%
N. Kuskokwim Bay	97	18	28%	22%	6%	44%
Tuntutuliak	88	35	9%	17%	14%	60%
Eek	81	21	19%	10%	5%	67%
Kasigluk	100	26	31%	19%	4%	46%
Nunapitchuk	118	42	24%	19%	2%	55%
Atmautluak	61	20	25%	25%	0%	50%
Napakiak	98	26	15%	27%	15%	42%
Napaskiak	92	32	13%	16%	6%	66%
Oscarville	16	6	33%	50%	0%	17%
Bethel	2,043	480	9%	6%	4%	81%
Kwethluk	164	52	17%	21%	10%	52%
Akiachak	156	51	18%	20%	0%	63%
Akiak	87	22	9%	0%	0%	91%
Tuluksak	88	28	11%	18%	4%	68%
Lower Kuskokwim	3,192	841	12%	11%	5%	71%
Lower Kalskag	68	7	57%	43%	0%	0%
Upper Kalskag	67	16	19%	19%	0%	63%
Aniak	190	56	41%	16%	5%	38%
Chuathbaluk	37	13	15%	8%	0%	77%
Middle Kuskokwim	362	92	35%	17%	3%	45%
Crooked Creek	41	11	18%	55%	0%	27%
Red Devil	13	7	29%	14%	0%	57%
Sleetmute	40	14	14%	21%	14%	50%
Stony River	21	8	25%	0%	0%	75%
Lime Village	15	-	-	-	-	-
McGrath	131	7	29%	14%	0%	57%
Takotna	25	-	-	-	-	-
Nikolai	33	3	33%	0%	0%	67%
Telida	2	-	-	-	-	-
Upper Kuskokwim	321	50	22%	22%	4%	52%
Kuskokwim River Total	3,972	1,001	15%	13%	5%	67%
Quinhagak	155	48	4%	17%	6%	73%
Goodnews Bay	70	19	5%	11%	11%	74%
Platinum	18	10	70%	0%	10%	20%
S. Kuskokwim Bay	243	77	13%	13%	8%	66%
Survey Total	4,215	1,078	15%	13%	5%	67%

Note: '*N*' is the total number of households, '*n*' is the number of households responding to the question about their subsistence needs. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes. Percentage is estimated by dividing the total number of fish harvested by the total respondents said were 'needed'.

Appendix F4.–Estimated proportion of coho salmon subsistence needs met, for households that subsistence fished, Kuskokwim area, 2010.

Community	N	n	25% needs met	50% needs met	75% needs met	100% needs met
Kongiganak	97	14	57%	14%	0%	29%
N. Kuskokwim Bay	97	14	57%	14%	0%	29%
Tuntutuliak	88	28	29%	7%	11%	54%
Eek	81	20	35%	0%	10%	55%
Kasigluk	100	14	64%	0%	21%	14%
Nunapitchuk	118	22	64%	18%	0%	18%
Atmautluak	61	14	71%	0%	0%	29%
Napakiak	98	22	45%	18%	9%	27%
Napaskiak	92	23	26%	4%	4%	65%
Oscarville	16	5	80%	0%	0%	20%
Bethel	2,043	576	9%	4%	2%	85%
Kwethluk	164	40	45%	10%	0%	45%
Akiachak	156	31	19%	10%	3%	68%
Akiak	87	17	12%	6%	0%	82%
Tuluksak	88	17	59%	0%	6%	35%
Lower Kuskokwim	3,192	829	19%	5%	3%	73%
Lower Kalskag	68	8	100%	0%	0%	0%
Upper Kalskag	67	7	43%	14%	0%	43%
Aniak	190	61	41%	13%	11%	34%
Chuathbaluk	37	6	67%	0%	0%	33%
Middle Kuskokwim	362	82	49%	11%	9%	32%
Crooked Creek	41	8	0%	75%	0%	25%
Red Devil	13	7	29%	14%	0%	57%
Sleetmute	40	6	33%	17%	0%	50%
Stony River	21	7	0%	14%	0%	86%
Lime Village	15	-	-	-	-	-
McGrath	131	7	29%	14%	0%	57%
Takotna	25	-	-	-	-	-
Nikolai	33	9	22%	0%	0%	78%
Telida	2	-	-	-	-	-
Upper Kuskokwim	321	44	18%	23%	0%	59%
Kuskokwim River Total	3,972	969	22%	7%	3%	68%
Quinhagak	155	45	20%	4%	4%	71%
Goodnews Bay	70	14	14%	29%	21%	36%
Platinum	18	9	33%	33%	11%	22%
S. Kuskokwim Bay	243	68	21%	13%	9%	57%
Survey Total	4,215	1,037	22%	7%	4%	67%

Note: '*N*' is the total number of households, '*n*' is the number of households responding to the question about their subsistence needs. Kuskokwim River total includes Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes. Percentage is estimated by dividing the total number of fish harvested by the total respondents said were 'needed'.

Appendix F5.–The estimated number of salmon needed for subsistence compared to the estimated number of salmon harvested for subsistence, by species and by subregion, Kuskokwim area, 2010.

	Number of Salmon							
	Chinook		Chum		Sockeye		Coho	
	Low Estimate	High Estimate	Low Estimate	High Estimate	Low Estimate	High Estimate	Low Estimate	High Estimate
N. Kuskokwim Bay								
Needed	2,560	3,822	3,517	6,033	2,752	4,446	1,287	2,327
Harvested	1,081	1,859	1,745	3,281	1,080	2,604	217	563
Lower Kuskokwim								
Needed	87,661	94,335	49,461	56,043	47,996	52,618	41,366	46,398
Harvested	55,341	60,297	34,370	39,142	28,470	31,872	24,718	28,788
Middle Kuskokwim								
Needed	11,504	14,640	7,126	11,796	5,535	7,321	5,840	7,562
Harvested	4,619	5,967	3,546	4,768	2,088	2,772	2,217	3,257
Upper Kuskokwim								
Needed	3,919	5,193	3,106	5,020	4,825	7,703	2,709	4,685
Harvested	1,233	1,715	2,120	3,324	3,075	4,245	1,332	3,120
S. Kuskokwim Bay								
Needed	4,819	6,065	2,331	3,181	3,719	4,721	2,756	3,718
Harvested	2,782	3,590	1,422	2,052	2,530	3,348	1,686	2,440
Total Kuskokwim Area								
Needed	113,419	121,097	69,469	78,147	67,799	73,835	56,406	62,242
Harvested	66,571	71,913	45,193	50,577	38,995	43,089	31,861	36,477

Note: Low and "High estimates" are based on the lower and upper confidence intervals associated with point estimates.

APPENDIX G: SALMON RETAINED FROM COMMERCIAL HARVEST

Appendix G1.–Reported number of salmon retained from commercial fishing for subsistence use, Kuskokwim area, 2010.

Community	N	n	Chinook	Chum	Coho	Sockeye	Pink
Kongiganak	97	10	57	65	15	189	0
N. Kuskokwim Bay	97	10	57	65	15	189	0
Tuntutuliak	88	26	2	0	6	5	2
Eek	81	12	10	0	40	15	0
Kasigluk	100	8	0	1	13	0	0
Nunapitchuk	118	19	0	0	1	1	0
Atmautluak	61	8	0	0	0	1	0
Napakiak	98	3	7	0	10	5	0
Napaskiak	92	13	0	0	0	0	0
Oscarville	16	2	0	0	0	0	0
Bethel	2,043	30	31	510	65	8	0
Kwethluk	164	11	0	7	0	0	0
Akiachak	156	21	0	4	2	0	0
Akiak	87	2	0	0	0	0	0
Tuluksak	88	6	0	0	0	0	0
Lower Kuskokwim	3,192	161	50	522	137	35	2
Lower Kalskag	68	0	0	0	0	0	0
Upper Kalskag	67	0	0	0	0	0	0
Aniak	190	1	0	0	0	0	0
Chuathbaluk	37	0	0	0	0	0	0
Middle Kuskokwim	362	1	0	0	0	0	0
Crooked Creek	41	0	0	0	0	0	0
Red Devil	13	0	0	0	0	0	0
Sleetmute	40	0	0	0	0	0	0
Stony River	21	0	0	0	0	0	0
Lime Village	15	0	-	-	-	-	-
McGrath	131	0	0	0	0	0	0
Takotna	25	0	-	-	-	-	-
Nikolai	33	0	0	0	0	0	0
Telida	2	0	-	-	-	-	-
Upper Kuskokwim	321	0	0	0	0	0	0
Kuskokwim River Total	3,972	172	107	587	152	224	2
Quinhagak	155	34	146	120	114	129	30
Goodnews Bay	70	9	1	0	1	5	3
Platinum	18	4	3	1	1	1	1
S. Kuskokwim Bay	243	47	150	121	116	135	34
Survey Total	4,215	219	257	708	268	359	36

Note: '*N*' is the total number of households, '*n*' is the number of households responding to the question about commercial fishing. Kuskokwim River Total includes the Lower, Middle, Upper Kuskokwim areas and North Kuskokwim Bay. Data is unavailable for cells with dashes.

APPENDIX H: ESTIMATED HARVESTS 1990 TO 2010

Appendix H1.–Estimated number of Chinook salmon harvested in the Kuskokwim area, 1990 to 2010.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Kongiganak	1,559	729	929	680	1,281	1,095	1,108	1,376	1,128	1,153	1,285	1,612	1,349	2,003	2,663	1,536	1,729	*1,984*	2,086	1,118	1,470
N. Kuskokwim Bay	1,559	729	929	680	1,281	1,095	1,108	1,376	1,128	1,153	1,285	1,612	1,349	2,003	2,663	1,536	1,729	1,984	2,086	1,118	1,470
Tuntutuliak	4,174	4,156	3,750	3,905	5,019	3,928	4,256	3,159	3,797	3,412	2,826	2,958	3,907	2,657	3,912	4,545	4,469	4,614	*4,420*	3,141	3,205
Eek	4,923	2,617	2,057	2,496	2,976	3,679	2,786	2,009	2,215	1,730	2,140	2,035	2,514	2,075	2,954	3,133	*2,700*	*2,635*	*2,826*	1,983	1,761
Kasigluk	3,300	2,875	*3,324*	*3,453*	*3,877*	*3,398*	*3,249*	*3,630*	*2,857*	*4,710*	3,857	*4,889*	*4,470*	*4,212*	7,859	*4,488*	*4,304*	*5,350*	*2,928*	2,296	3,020
Nunapitchuk	4,192	4,004	4,123	3,852	4,580	4,543	3,479	3,605	4,502	4,215	3,425	3,328	4,503	3,179	4,921	4,103	4,121	4,661	*4,361*	3,256	2,548
Atmautluak	2,895	1,661	1,239	1,715	1,856	2,016	1,752	1,648	1,397	1,372	1,191	754	1,479	547	2,153	1,927	*1,422*	1,890	*1,868*	1,615	1,091
Napakiak	4,427	2,573	4,147	3,822	3,355	3,515	3,842	2,908	3,436	2,265	2,073	2,408	2,702	2,438	2,839	3,060	5,125	3,245	2,183	2,331	1,640
Napaskiak	6,586	4,008	5,299	5,566	6,521	4,862	5,261	4,756	4,901	3,633	4,175	4,596	3,922	3,390	4,058	4,485	5,877	6,392	4,963	5,618	4,313
Oscarville	1,263	1,476	*1,480*	1,496	1,390	1,046	995	*953*	754	1,543	*1,264*	1,779	1,115	1,153	1,325	1,069	1,052	1,360	1,351	754	618
Bethel	34,925	18,041	22,220	19,800	31,251	32,463	32,116	20,100	24,877	22,751	20,629	24,684	22,892	24,584	29,443	28,293	27,805	30,422	35,205	26,302	24,973
Kwethluk	10,657	7,298	6,949	9,280	9,546	9,907	9,786	6,319	7,502	6,366	5,174	6,460	6,880	4,206	7,157	6,089	7,258	6,466	8,303	6,601	4,445
Akiachak	8,395	5,607	8,130	7,678	7,622	6,410	5,689	6,699	6,026	5,210	6,311	6,978	6,946	2,493	7,131	5,411	5,561	7,621	9,475	7,023	4,470
Akiak	5,966	3,168	3,452	4,478	4,653	4,401	4,851	3,196	2,943	2,377	2,335	3,528	3,390	3,905	3,775	3,860	4,423	4,297	3,493	3,247	3,625
Tuluksak	2,022	3,114	2,330	3,662	4,414	4,175	3,309	5,456	3,554	2,239	2,464	2,520	2,860	3,286	3,766	2,655	2,372	*3,886*	3,425	3,032	2,110
Lower Kuskokwim River	93,725	60,598	68,499	71,203	87,060	84,343	81,371	64,438	68,761	61,823	57,864	66,917	67,580	58,125	81,293	73,118	76,488	82,839	84,801	67,199	57,819
Lower Kalskag	2,946	4,022	2,338	3,603	4,087	4,541	3,513	3,103	1,954	1,726	1,691	2,432	1,535	1,556	1,991	1,417	3,494	1,937	2,442	2,439	1,030
Upper Kalskag	1,618	1,031	1,321	1,682	1,297	1,447	1,304	941	1,394	1,670	1,234	1,149	1,545	1,328	2,498	2,533	1,569	1,383	2,241	1,615	1,500
Aniak	3,589	3,562	3,976	4,651	3,714	3,506	3,343	3,640	3,466	2,603	3,100	2,684	4,576	1,837	3,022	1,977	2,412	3,417	3,252	2,062	2,212
Chuathbaluk	1,718	998	986	1,443	1,013	2,461	914	1,204	730	1,035	281	700	505	405	1,460	913	887	*1,007*	785	888	551
Middle Kuskokwim River	9,871	9,613	8,621	11,379	10,111	11,955	9,074	8,888	7,544	7,034	6,306	6,965	8,161	5,126	8,971	6,840	8,362	7,744	8,720	7,004	5,293

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Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Crooked Creek	971	916	583	707	1,126	874	890	963	768	702	592	689	859	582	946	948	736	*734*	598	586	240
Red Devil	297	154	400	449	409	412	359	404	243	141	95	174	293	31	156	181	232	301	152	226	33
Sleetmute	777	887	782	1,795	1,295	964	1,265	1,171	978	414	412	505	604	600	906	522	750	861	644	702	272
Stony River	574	614	247	445	391	534	596	874	*296*	46	*197*	167	415	118	688	*325*	*278*	*561*	667	704	189
Lime Village	399	70	*181*	40	195	180	*123*	57	241	145	69	251	*206*	34	69	*176*	*125*	*120*	*59*	*59*	*81*
McGrath	896	902	1,586	550	1,026	804	1,223	995	872	1,033	656	444	970	395	587	*882*	689	495	573	594	257
Takotna	74	0	*7*	0	0	*11*	*6*	*3*	2	0	0	5	10	*0*	16	*9*	0	*12*	*0*	*0*	*0*
Nikolai	635	337	818	426	449	938	398	212	380	284	144	280	535	120	493	553	696	504	221	299	402
Telida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim River	4,623	3,880	4,605	4,412	4,891	4,717	4,860	4,679	3,780	2,765	2,165	2,515	3,892	1,880	3,861	3,596	3,506	3,588	2,914	3,170	1,474
Kuskokwim River Total	109,778	74,820	82,654	87,674	103,343	102,110	96,413	79,381	81,213	72,775	67,620	78,009	80,982	67,134	96,788	85,090	90,085	96,155	98,521	78,491	66,056
Quinhagak	3,881	3,753	4,394	3,634	3,977	2,864	3,506	3,186	3,774	2,815	3,053	3,177	2,649	2,563	4,563	3,505	5,163	4,686	4,090	2,982	2,692
Goodnews Bay	358	852	548	590	672	789	392	441	735	759	564	863	723	807	863	869	713	*647*	1,060	566	480
Platinum	202	20	67	75	74	24	*41*	14	*57*	69	99	57	154	45	122	74	45	*66*	42	61	14
South Kuskokwim Bay	4,441	4,625	5,009	4,299	4,723	3,677	3,939	3,641	4,566	3,643	3,716	4,097	3,526	3,415	5,548	4,448	5,921	5,399	5,192	3,609	3,186
																					-
Total Estimated Harvest	114,219	79,445	87,663	91,973	108,066	105,787	100,352	83,022	85,779	76,418	71,336	82,106	84,508	70,549	102,336	89,538	96,006	101,554	103,713	82,100	69,242

Note: Dashes indicate harvest was not estimated. Italic: indicates Bayesian imputed estimates.

Appendix H2.–Estimated number of chum salmon harvested in the Kuskokwim area, 1990 to 2010.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Kongiganak	1,009	978	1,584	708	1,414	1,269	1,763	753	1,579	1,049	1,839	2,399	3,247	897	2,958	1,960	2,420	*2,158*	1,592	1,285	2,513
N. Kuskokwim Bay	1,009	978	1,584	708	1,414	1,269	1,763	753	1,579	1,049	1,839	2,399	3,247	897	2,958	1,960	2,420	2,158	1,592	1,285	2,513
Tuntutuliak	6,592	4,697	6,245	3,325	5,346	3,509	6,119	2,435	3,640	1,709	2,622	2,585	4,150	1,288	2,546	3,568	4,024	3,350	*4,655*	3,411	2,439
Eek	3,014	790	1,324	250	591	899	999	556	795	484	636	402	1,228	578	688	877	*1,256*	*803*	*725*	763	721
Kasigluk	3,877	3,013	*4,759*	*2,269*	*3,012*	*2,605*	*4,143*	*1,460*	*2,102*	*3,768*	4,689	*4,972*	*5,783*	*2,733*	5,064	*3,413*	*4,958*	*4,292*	*1,677*	1,618	2,403
Nunapitchuk	6,448	5,840	9,195	4,895	4,560	4,264	6,255	2,465	4,885	4,428	4,865	4,724	8,002	2,865	5,053	4,167	5,150	6,619	*5,057*	3,400	3,223
Atmautluak	4,676	2,241	2,614	1,300	1,420	3,768	2,660	1,395	1,875	1,552	1,848	1,397	2,514	849	2,271	1,940	*2,664*	2,193	*2,428*	1,708	1,406
Napakiak	9,714	2,351	5,474	2,269	3,819	2,820	4,352	1,430	3,605	1,495	2,859	1,793	3,421	1,560	2,328	3,238	8,143	3,628	1,809	1,677	1,766
Napaskiak	11,334	6,703	7,817	3,653	5,797	4,137	6,200	2,318	3,771	2,529	2,757	2,364	4,010	2,061	2,705	2,205	4,323	3,032	2,857	1,532	3,110
Oscarville	1,400	1,147	*1,515*	561	676	740	1,548	*434*	378	1,530	*1,260*	1,831	1,319	804	828	686	1,151	932	836	534	352
Bethel	34,257	16,781	17,231	8,608	15,722	17,416	21,706	8,078	12,522	9,918	10,149	10,757	17,731	11,452	13,448	14,273	20,953	16,540	18,660	10,480	10,986
Kwethluk	11,451	5,714	8,001	3,499	6,340	6,114	12,043	3,266	4,508	3,582	5,232	4,601	8,019	2,294	4,288	4,328	6,328	6,291	5,871	3,410	3,082
Akiachak	10,565	5,921	9,532	3,308	5,998	3,992	5,019	1,615	2,218	2,696	4,719	3,170	5,173	2,650	3,880	2,428	4,333	4,782	4,027	2,822	2,856
Akiak	9,226	6,575	6,679	7,577	4,483	2,007	4,967	1,639	1,894	1,210	2,617	2,240	2,571	2,928	3,499	3,528	3,095	4,141	2,949	1,350	1,163
Tuluksak	5,863	5,454	4,632	3,774	2,395	2,698	3,208	2,790	3,044	1,480	2,492	2,068	3,719	894	2,433	2,183	3,094	*3,204*	4,016	1,488	3,249
Lower Kuskokwim River	118,417	67,227	85,018	45,288	60,159	54,969	79,219	29,882	45,237	36,381	46,745	42,904	67,640	32,956	49,031	46,834	69,472	59,807	55,567	34,193	36,756
Lower Kalskag	4,980	2,958	2,807	2,938	2,856	1,438	4,070	1,298	968	733	1,534	1,498	1,445	1,087	1,316	997	4,703	1,997	2,030	899	691
Upper Kalskag	1,406	3,139	3,040	591	836	1,326	1,565	349	464	649	1,550	1,502	2,460	516	1,656	1,201	2,469	294	1,751	305	393
Aniak	10,160	3,511	7,687	2,926	2,538	3,454	8,569	1,678	4,964	1,753	1,933	1,934	4,367	820	2,535	2,952	3,722	4,108	2,839	2,626	2,538
Chuathbaluk	4,408	2,138	2,644	2,879	1,495	1,701	2,175	1,135	925	698	654	2,711	1,458	2,502	2,352	530	1,451	*1,741*	606	948	535
Middle Kuskokwim River	20,954	11,746	16,178	9,334	7,725	7,919	16,379	4,460	7,321	3,833	5,671	7,645	9,730	4,925	7,859	5,680	12,345	8,140	7,226	4,778	4,157

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Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2,008	2,009	2009
Crooked Creek	2,977	1,326	1,242	664	757	332	355	313	2,527	830	809	1,211	1,417	750	1,583	1,064	1,513	*853*	970	522	539
Red Devil	1,613	1,133	1,500	927	1,318	882	727	499	462	169	54	334	384	63	135	214	41	186	171	214	122
Sleetmute	2,006	1,880	2,961	692	1,520	1,683	1,250	417	870	340	371	379	1,293	468	1,054	422	1,475	818	346	375	524
Stony River	1,234	638	1,165	775	881	1,311	443	600	*728*	296	*315*	172	696	361	754	*523*	*727*	*535*	1,403	771	338
Lime Village	2,350	830	*1,343*	497	1,600	789	*338*	244	964	1,015	451	651	*817*	110	199	*609*	*320*	*437*	*452*	*452*	*277*
McGrath	2,326	1,083	4,472	578	1,264	1,525	211	138	1,510	242	188	247	969	513	290	*525*	999	464	1,247	842	482
Takotna	64	0	*14*	0	6	*1*	*0*	*0*	15	0	0	10	1	*0*	0	*5*	0	*1*	*0*	*0*	*0*
Nikolai	875	396	914	334	293	297	229	60	519	87	56	53	187	124	277	178	308	204	65	302	440
Telida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim River	13,445	7,286	13,611	4,467	7,639	6,820	3,553	2,271	7,595	2,979	2,244	3,057	5,764	2,389	4,292	3,540	5,384	3,498	4,654	3,478	2,722
Kuskokwim River Total	153,825	87,237	116,391	59,797	76,937	70,977	100,913	37,366	61,732	44,242	56,499	56,005	86,381	41,167	64,140	58,013	89,620	73,603	69,039	43,734	46,148
Quinhagak	3,161	1,631	2,287	1,053	1,401	669	943	572	1,375	1,587	895	808	2,011	559	1,383	994	2,754	2,249	1,740	1,300	1,376
Goodnews Bay	200	136	1,311	177	406	140	221	135	295	232	251	187	349	200	240	192	555	*307*	764	137	324
Platinum	149	4	137	0	51	3	*2*	0	*11*	33	82	60	95	19	42	21	108	*28*	106	28	37
South Kuskokwim Bay	3,510	1,771	3,735	1,230	1,858	812	1,166	707	1,681	1,852	1,228	1,055	2,455	778	1,665	1,207	3,417	2,584	2,610	1,465	1,737
Total Estimated Harvest	157,335	89,008	120,126	61,027	78,795	71,789	102,079	38,073	63,413	46,094	57,727	57,060	88,836	41,945	65,805	59,220	93,037	76,187	71,649	45,199	47,885

Note: Dashes indicate harvest was not estimated. Italic: indicates Bayesian imputed estimates.

Appendix H3.–Estimated number of sockeye salmon harvested in the Kuskokwim area, 1990 to 2010.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Kongiganak	552	498	923	583	743	658	951	976	878	908	1,770	1,546	1,347	929	1,809	1,103	1,464	*1,083*	1,347	808	1,842
N. Kuskokwim Bay	552	498	923	583	743	658	951	976	878	908	1,770	1,546	1,347	929	1,809	1,103	1,464	1,083	1,347	808	1,842
Tuntutuliak	2,132	1,768	1,846	1,063	3,289	1,082	1,561	1,724	1,227	2,070	1,180	1,702	1,045	1,148	1,620	2,145	1,834	1,763	*2,226*	954	2,068
Eek	1,293	479	669	363	452	308	526	503	375	595	883	1,085	759	586	567	1,033	*673*	*663*	*693*	1,115	1,241
Kasigluk	843	1,376	*1,951*	*1,769*	*956*	*794*	*1,075*	*1,320*	*834*	*3,229*	3,805	*3,733*	*1,537*	*1,683*	1,668	*1,273*	*1,926*	*1,635*	*1,230*	927	1,448
Nunapitchuk	1,520	2,193	2,329	2,743	1,633	870	1,877	2,082	2,029	3,258	2,194	2,529	1,500	1,714	1,659	1,821	1,871	2,147	*2,410*	1,455	1,902
Atmautluak	1,696	830	1,193	1,313	837	1,173	1,408	681	982	1,743	1,540	988	1,150	679	1,103	1,444	*1,011*	1,041	*1,406*	641	735
Napakiak	1,548	1,187	1,663	1,217	1,533	887	1,106	1,526	1,487	2,018	1,916	1,917	1,688	1,453	1,351	2,122	1,845	1,962	1,630	916	1,187
Napaskiak	1,660	2,850	3,116	3,508	1,933	1,573	3,180	2,209	1,457	1,929	2,525	3,377	1,296	1,643	1,148	1,344	1,784	1,738	2,684	1,655	1,979
Oscarville	287	726	*1,169*	957	398	301	208	*492*	249	1,724	*1,331*	1,451	400	806	436	278	778	712	677	334	250
Bethel	11,787	11,428	9,225	9,501	11,370	8,802	10,556	10,233	8,464	12,094	11,613	14,264	8,850	12,198	11,679	14,297	12,816	13,902	18,016	11,329	10,662
Kwethluk	4,271	3,746	1,958	3,802	3,864	2,536	3,963	3,288	3,785	3,485	3,859	4,191	2,100	1,903	3,302	2,457	2,770	3,536	5,045	2,228	2,571
Akiachak	3,461	4,029	3,970	4,990	3,241	1,942	2,767	2,737	2,395	3,066	3,687	4,680	2,507	1,607	3,109	2,372	2,661	3,269	4,700	2,390	2,433
Akiak	1,873	1,696	1,769	3,537	1,740	809	1,544	1,327	1,640	1,151	1,036	2,005	1,214	995	1,258	1,920	2,000	3,695	2,539	1,290	1,161
Tuluksak	1,225	3,427	2,063	2,452	1,390	1,270	1,108	1,514	1,413	1,412	2,201	1,862	1,205	875	1,670	987	2,247	*2,021*	2,305	1,601	2,534
Lower Kuskokwim River	33,596	35,735	32,921	37,215	32,636	22,347	30,879	29,636	26,337	37,774	37,770	43,784	25,251	27,290	30,570	33,493	34,215	38,084	45,561	26,835	30,171
	0																				0
Lower Kalskag	1,007	1,080	503	2,286	989	679	1,387	1,277	546	583	824	918	347	515	775	439	1,434	780	1,736	1,009	507
Upper Kalskag	284	314	354	346	288	82	284	216	238	586	588	319	508	431	686	945	563	417	961	355	465
Aniak	1,539	2,073	1,213	1,609	751	955	1,295	1,078	1,132	1,302	1,136	2,167	1,059	756	996	1,015	692	1,261	1,796	941	1,055
Chuathbaluk	1,157	1,471	497	822	924	465	687	796	223	441	476	614	313	274	526	369	508	*523*	379	572	403
Middle Kuskokwim River	3,987	4,938	2,567	5,063	2,952	2,181	3,653	3,367	2,139	2,912	3,024	4,018	2,227	1,976	2,983	2,768	3,197	2,981	4,872	2,877	2,430

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Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2,008	2,009	2010
Crooked Creek	1,607	968	738	752	558	177	311	350	717	710	514	640	449	571	732	693	544	*604*	785	323	302
Red Devil	455	391	355	662	336	576	914	637	692	497	109	360	109	309	88	272	510	318	379	417	475
Sleetmute	1,153	1,347	794	1,643	1,120	1,109	1,341	1,458	1,282	879	725	1,008	706	504	980	673	1,181	1,303	1,071	692	1,024
Stony River	933	1,966	1,389	1,485	758	1,281	1,267	1,626	*1,114*	1,018	*578*	163	602	158	896	*709*	*853*	*1,085*	1,679	977	372
Lime Village	2,125	1,110	*1,332*	2,743	1,733	857	*1,140*	642	2,782	2,619	1,409	1,453	*1,176*	374	874	*1,377*	*1,182*	*1,495*	*1,180*	*1,180*	*796*
McGrath	1,489	416	2,494	1,465	1,501	1,652	111	52	146	0	43	273	407	112	194	*481*	149	375	1,292	985	622
Takotna	0	0	*1*	0	0	*1*	*1*	*1*	0	0	0	0	0	*2*	0	*1*	0	*1*	*0*	*0*	*4*
Nikolai	0	1	0	5	25	65	23	0	16	43	0	0	22	16	1	19	20	10	16	66	65
Telida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim River	7,762	6,199	7,103	8,755	6,031	5,718	5,108	4,766	6,749	5,766	3,378	3,897	3,471	2,046	3,765	4,225	4,439	5,192	6,402	4,640	3,660
Kuskokwim River Total	45,897	47,370	43,514	51,616	42,362	30,905	40,591	38,744	36,103	47,360	45,942	53,245	32,296	32,241	39,127	41,589	43,315	47,339	58,182	35,160	38,103
Quinhagak	1,710	1,818	1,448	1,228	962	597	499	460	1,368	1,433	1,368	1,054	909	805	1,375	1,745	3,128	1,755	2,714	1,740	1,671
Goodnews Bay	982	1,061	1,293	733	646	202	387	480	499	715	951	908	855	705	873	1,213	995	*880*	3,131	885	1,093
Platinum	163	134	238	48	90	32	*56*	143	*79*	106	188	83	257	64	183	90	63	*118*	156	186	175
South Kuskokwim Bay	2,855	3,013	2,979	2,009	1,698	831	942	1,083	1,946	2,254	2,507	2,045	2,021	1,574	2,431	3,048	4,186	2,753	6,001	2,811	2,939
Total Estimated Harvest	48,752	50,383	46,493	53,625	44,060	31,736	41,532	39,827	38,049	49,614	48,449	55,290	34,317	33,815	41,558	44,637	47,501	50,092	64,183	37,971	41,042

Note: Dashes indicate harvest was not estimated. Italic: indicates Bayesian imputed estimates.

Appendix H4.–Estimated number of coho salmon harvested in the Kuskokwim area, 1990 to 2010.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Kongiganak	474	490	605	448	569	662	579	514	204	203	339	919	1,138	236	937	740	657	*883*	551	610	390
N. Kuskokwim Bay	474	490	605	448	569	662	579	514	204	203	339	919	1,138	236	937	740	657	883	551	610	390
																					0
Tuntutuliak	1,287	733	693	820	364	339	1,335	558	858	277	3,264	335	1,239	2,092	1,189	1,074	948	703	*3,238*	368	698
Eek	1,800	387	502	160	399	387	437	63	314	242	493	241	821	747	1,018	378	*652*	*389*	*1,307*	193	315
Kasigluk	922	1,723	*1,811*	*399*	*676*	*269*	*815*	*337*	*299*	*4,213*	9,726	*1,682*	*3,494*	*1,505*	5,034	*1,906*	*3,008*	*2,826*	*917*	617	1,078
Nunapitchuk	746	1,131	2,242	318	749	629	1,444	732	345	368	355	425	821	627	555	807	692	1,752	*648*	281	195
Atmautluak	398	237	333	380	402	634	534	485	283	190	227	375	612	283	744	530	*500*	424	*403*	66	36
Napakiak	1,470	599	1,570	586	871	344	602	161	739	459	453	667	793	992	1,648	742	2,363	1,244	1,383	428	884
Napaskiak	1,139	798	1,108	780	2,016	584	506	592	488	316	836	455	717	983	655	602	1,640	639	717	821	1,015
Oscarville	57	147	*160*	0	48	0	15	*0*	0	779	*388*	90	161	19	304	60	175	180	62	67	12
Bethel	32,988	17,677	24,908	12,310	17,082	22,007	21,982	17,077	12,058	11,565	13,478	14,108	15,489	15,062	17,040	12,994	18,810	12,972	16,998	13,037	19,000
Kwethluk	3,928	2,311	2,419	1,809	1,880	1,690	2,995	1,104	1,583	2,883	3,435	1,773	2,706	1,787	3,430	3,048	1,245	1,624	7,058	4,113	1,527
Akiachak	1,910	2,337	3,058	1,102	1,281	628	903	383	409	662	2,555	1,912	1,690	1,627	2,397	1,817	1,714	2,355	4,098	1,581	1,181
Akiak	1,789	2,193	1,072	1,373	1,099	481	920	798	521	259	479	594	1,136	1,094	1,342	1,847	379	1,325	1,276	661	475
Tuluksak	978	1,854	1,629	408	223	522	1,175	418	812	298	520	1,136	1,349	921	1,007	484	498	*1,401*	788	839	337
Lower Kuskokwim River	49,412	32,127	41,505	20,445	27,090	28,514	33,663	22,708	18,709	22,511	36,209	23,793	31,028	27,739	36,363	26,289	32,624	27,835	38,893	23,072	26,753
Lower Kalskag	445	500	526	823	881	715	1,246	572	345	285	403	597	281	314	368	319	1,415	515	95	307	96
Upper Kalskag	346	527	972	353	178	257	348	661	834	155	286	536	1,069	462	1,500	594	1,799	381	1,939	225	93
Aniak	1,669	1,171	1,933	1,104	1,768	1,244	2,723	1,428	1,284	1,419	1,911	2,006	3,737	1,164	2,355	2,032	1,018	3,003	3,013	2,264	2,472
Chuathbaluk	826	87	368	366	741	79	409	196	50	138	462	733	610	259	284	346	727	*498*	554	97	76
Middle Kuskokwim River	3,286	2,285	3,799	2,646	3,568	2,295	4,726	2,857	2,513	1,997	3,062	3,872	5,697	2,199	4,507	3,291	4,959	4,397	5,601	2,893	2,737

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Appendix H4.–Page 2 of 2.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2,008	2,009	2010
Crooked Creek	922	279	712	396	646	358	175	261	394	529	137	97	440	375	713	312	401	*392*	1,865	282	87
Red Devil	914	1,038	1,284	1,673	1,074	1,539	1,135	1,455	504	424	161	426	499	351	65	331	171	193	335	111	88
Sleetmute	1,036	1,588	937	912	626	1,104	870	419	267	210	525	428	806	731	505	581	671	360	210	384	458
Stony River	474	513	727	511	477	1,023	529	455	*466*	423	*420*	397	662	214	679	*534*	*456*	*434*	521	634	201
Lime Village	486	390	*376*	606	1,467	223	*629*	270	776	701	556	559	*706*	46	231	*383*	*169*	*450*	*624*	*624*	*171*
McGrath	466	477	2,146	563	998	604	824	745	734	338	881	436	1,508	997	1,228	*736*	894	279	178	1,244	1,053
Takotna	0	0	*4*	0	0	*1*	*8*	*2*	3	0	20	31	25	*10*	51	*10*	0	*9*	*0*	*0*	*33*
Nikolai	90	65	204	285	94	499	36	130	97	73	30	131	93	361	171	171	407	102	63	204	135
Telida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Kuskokwim River	4,388	4,350	6,390	4,946	5,382	5,351	4,205	3,737	3,241	2,698	2,730	2,505	4,739	3,085	3,643	3,058	3,169	2,217	3,796	3,483	2,226
Kuskokwim River Total	57,560	39,252	52,299	28,485	36,609	36,823	43,173	29,816	24,667	27,409	42,341	31,089	42,602	33,259	45,450	33,378	41,408	35,332	48,841	30,058	32,106
Quinhagak	3,799	3,230	3,291	2,029	2,544	2,480	1,734	1,105	1,537	1,781	1,042	1,719	1,133	1,868	1,435	1,558	1,315	1,550	2,296	1,692	1,547
Goodnews Bay	1,630	1,704	1,671	1,118	428	268	330	348	323	421	380	548	198	1,228	1,542	634	605	*497*	1,491	259	319
Platinum	95	36	290	27	87	11	*41*	55	*67*	147	100	118	96	144	266	223	116	*102*	114	81	197
South Kuskokwim Bay	5,524	4,970	5,252	3,174	3,059	2,759	2,105	1,508	1,927	2,349	1,522	2,385	1,427	3,240	3,243	2,415	2,036	2,149	3,901	2,032	2,063
Total Estimated Harvest	63,084	44,222	57,551	31,659	39,668	39,582	45,279	31,324	26,594	29,758	43,863	33,474	44,029	36,499	48,693	35,793	43,444	37,481	52,742	32,090	34,169

Note: Dashes indicate harvest was not estimated. Italic: indicates Bayesian imputed estimates.

APPENDIX I: APPROXIMATE MEASUREMENTS USED TO CONVERT REPORTED AMOUNTS OF FISH HARVEST

Appendix I1.–Approximate measurements used to convert reported amounts of fish harvest, Kuskokwim area, 2008 to 2010.

Amounts	Description
Salmon	
1 king salmon = 5-8 lb. strips	dried and smoked king salmon
1 **gal.** Ziploc = 5 lb. Strips	dried and smoked king salmon
1 **qt.** Ziploc = 2 lb. Strips	dried and smoked king salmon
6 gal. Bucket = 4-5 kings	dried king salmon
5 gal. "poke fish" = 25-30 chum	dried chum in seal oil
30 gal. barrel = 150-180 chum	dried chum in seal oil
1 gal. Ziploc = 2-3 chum	dried chum filets
5 gal. bucket = 25 chum	chum filets, tightly packed
1 dried chum = 2/3 lb.	summer chum salmon for dog food
1 bundle = 50 dried chum	summer chum salmon for dog food
300 dog salmon/dog/winter	feeding summer chum to a dog team
1 dried chum = 1 1/4 to 1 1/3 lbs.	summer or fall chum
1 pink salmon = 3 lb.	pink salmon
Other fish	
1 small whitefish = 1 lb.	round whitefish, least, Bering, or arctic cisco, caught in whitefish net (4" or smaller mesh) or fish wheel
1 large whitefish = 4 lb.	broad or humpback whitefish, caught in chum net (5" or larger mesh) or fish wheel
125 smelt = 5 gal. bucket	
1 gunny sack = 50 to 100 lbs. (ask fisherman)	"tomcod", whitefish, herring
14 blackfish = 1 lb. **350 blackfish = 5 gal. bucket** = 25 lb.	blackfish
1 eel = 1/3 lb.	arctic lamprey